

MARINE ISOPODS FROM THE LESSER ANTILLES AND COLOMBIA (CRUSTACEA: PERACARIDA)

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Abstract.—Records of shallow-water marine isopods from Colombia, Tobago, and Dominica are listed. These are derived from recent collections as well as from published records. Several new species are described: *Joeropsis tobagoensis*, *Munna caprinsula*, *Anopsilana sinu*, *Paraimene charlesae* (the second known species in the genus), *Pseudocerceis latistylis* (the first record of the genus in the Atlantic), *Sphaeromopsis heardi*, and *Astacilla marna*.

While records of marine isopods from the overall Caribbean are relatively plentiful, the south-eastern region including the Lesser Antilles, Trinidad and Tobago, and Venezuela, is poorly represented (see Kensley & Schotte 1989). The work of H.-G. Müller in Colombia (see Table 1) has revealed the rich isopod fauna of the south-western Caribbean. With reference to marine isopods, the faunal ties with the shallow-water northern Brazilian region are slender, being about 3% of the Caribbean fauna (Kensley & Schotte 1989:262), but this figure almost certainly will change with increased collecting. This paper attempts to fill some of the gaps in the knowledge of the shallow-water isopod diversity of the southeastern Caribbean. Material was collected by both authors (BK & MS) on two separate occasions around the island of Dominica, and by the second author (MS) on a single field-trip to Tobago. Material from the latter island was also made available by Dr. R. W. Heard (RH), the result of two collecting trips sponsored by J. David Hardy, for a faunal survey requested by the Tobago House of Assembly. Material from two collecting trips to Colombia was made available by Dr. R. Lemaitre (RL) and Dr. Darryl Felder (DF). Much of the material from Dominica and Tobago represents either range extensions

or new records, but no attempt has been made to indicate these in Table 1.

Systematics

Suborder Asellota
Family Joeropsidae

Joeropsis tobagoensis, new species
Fig. 1

Material.—Holotype, USNM 252761, ♂ tl 1.9 mm, Allotype, USNM 252762, ♀ tl 1.8 mm, Paratypes, USNM 252763, 5 ♂, 2 ovig. ♀, 11 ♀, sta 5, Sandy Bay, Tobago, sand and rock washings, intertidal to 1.5 m, coll. RH, 7 Apr 1992.—USNM 252764, 1 ♂, Pigeon Point, Tobago, coll. RH, 7 Apr 1992.—USNM 252765, 2 ♂, 2 ♀, sta 8, east side of Man o' War Bay, Tobago, rocky intertidal, coll. RH, 6 Apr 1992.—USNM 252766, 1 ♂, Goat Island, Tobago, sediment, 4-5 m, coll. RH, 14 Jan 1993.

Diagnosis.—Free margin of rostrum broadly convex. Lateral margins of cephalon entire. Lateral margins of pleotelson having 3 teeth. Dorsal cephalon with reticulated pigmentation.

Description.—Male: Body 3 times longer than wide. Cephalon width 1.4 times length. Rostrum evenly convex with fringe of transparent teeth, flanked by rounded lobes. Pigment reticulated, on cephalon only. An-

Table 1.—Records of marine isopods from Colombia, Dominica, and Tobago, compiled from the collections mentioned in the Introduction, plus the published Colombian records of Müller (1988a, 1988b, 1989, 1990a, 1990b, 1990c, 1990d, 1991, 1992, 1993a, 1993b, 1993c).

Species	Colombia	Dominica	Tobago
Anthuridea			
Family Anthuridae			
<i>Amakusanthura paramagnifica</i>	+		
<i>Amakusanthura signata</i>	+	+	
<i>Amakusanthura tengo</i>	+		
<i>Amakusanthura vermiformis</i>	+		
<i>Apanthura cracenta</i>			+
<i>Apanthuroides millae</i>		+	
<i>Chalixanthura</i> sp.			+
<i>Cortezura confixa</i>	+		
<i>Licranthura amyle</i>		+	
<i>Mesanthura cf. brasiliensis</i>	+		
<i>Mesanthura fasciata</i>			+
<i>Mesanthura hopkinsi</i>	+		
<i>Mesanthura paucidens</i>	+		+
<i>Mesanthura pulchra</i>	+	+	
<i>Mesanthura punctillata</i>	+	+	
<i>Minyanthura corallicola</i>	+	+	
<i>Pendantura hendleri</i>			+
Family Hyssuridae			
<i>Chalixanthura colombiana</i>	+		
<i>Eisothistos tayronae</i>	+		
<i>Kupellonura</i> sp.			+
<i>Stellanthura caribbica</i>	+		
<i>Xenanthura conchae</i>	+		
Family Paranthuridae			
<i>Accalathura crenulata</i>		+	
<i>Colanthura tenuis</i>	+		
<i>Paranthura infundibulata</i>	+	+	+
Asellota			
Family Gnathostenetroididae			
<i>Neostenetroides</i> sp.			+
Family Janiridae			
<i>Carpas algicola</i>		+	+
<i>Carpas brachydactylus</i>			+
<i>Carpas parvus</i>	+		
<i>Carpas punctatus</i>		+	+
<i>Carpas serricaudus</i>	+	+	+
<i>Carpas triton</i>	+		
<i>Janira gracilis</i>	+		
Family Joeropsidae			
<i>Joeropsis paradubia</i>	+		
<i>Joeropsis personata</i>	+		
<i>Joeropsis rathbunae</i>	+		+
<i>Joeropsis tayrona</i>	+		
<i>Joeropsis tobagoensis</i>		+	

Table 1.—Continued.

Species	Colombia	Dominica	Tobago
Family Munnidae			
<i>Munna caprinsula</i>		+	
<i>Uromunna</i> sp. A			+
<i>Uromunna</i> sp. B			+
<i>Uromunna</i> sp. C			+
Family Paramunnidae			
<i>Munnogonium wilsoni</i>			+
Family Pleurocopidae			
<i>Pleurocope floridensis</i>			+
Family Santiidae			
<i>Halacarsantia</i> sp.			+
<i>Santia milleri</i>		+	+
Family Stenetriidae			
<i>Stenetrium minocule</i>	+		+
<i>Stenetrium patulipalma</i>			+
<i>Stenetrium stebbingi</i>	+	+	+
Family Incertae Sedis			
<i>Mexicope kensleyi</i>		+	
Flabellifera			
Family Aegidae			
<i>Rocinela signata</i>	+		+
Family Cirolanidae			
<i>Anopsilana sinu</i>	+		
<i>Calyptolana hancocki</i>	+		+
<i>Cirolana kiliani</i>	+		
<i>Cirolana parva</i>	+	+	+
<i>Colopisthus parvus</i>	+		
<i>Eurydice personata</i>			+
<i>Excirolana brasiliensis</i>			+
<i>Excirolana mayana</i>	+		+
<i>Metacirolana agaricola</i>	+		
<i>Metacirolana agujae</i>	+		
<i>Metacirolana halia</i>	+		
<i>Metacirolana sphaeromiformis</i>		+	+
<i>Neocirolana tayronae</i>	+		
Family Corallanidae			
<i>Alcirona krebsii</i>			+
<i>Excorallana delaneyi</i>			+
<i>Excorallana sexticornis</i>	+		+
<i>Excorallana tricornis tricornis</i>	+		
<i>Excorallana warmingii</i>			+
Family Cymothoidae			
<i>Cymothoa excisa</i>			+
Family Limnoriidae			
<i>Limnoria indica</i>	+		+
<i>Limnoria pfefferi</i>	+		+

Table 1.—Continued.

Species	Colombia	Dominica	Tobago
<i>Limnoria platycauda</i>	+	+	+
<i>Paralimnoria andrewsi</i>	+		
<i>Phycolimnoria clarkae</i>			+
Family Serolidae			
<i>Serolis mgrayi</i>	+		
Family Sphaeromatidae			
<i>Ancinus braziliensis</i>			+
<i>Cassidinidea ovalis</i>		+	+
<i>Dynamenella perforata</i>			+
<i>Exosphaeroma diminutum</i>			+
<i>Geocerceis barbarae</i>		+	
<i>Paracerceis caudata</i>	+	+	+
<i>Paradella plicatura</i>		+	
<i>Paraimene charlesae</i>		+	+
<i>Paraleptosphaeroma glynni</i>		+	
<i>Pseudocerceis latistylis</i>		+	
<i>Sphaeromopsis heardi</i>		+	+
Gnathiidea			
Family Gnathiidae			
<i>Gnathia beethoveni</i>	+		+
<i>Gnathia gonzalezi</i>	+		
<i>Gnathia magdalenensis</i>	+		
<i>Gnathia samariensis</i>	+		
<i>Gnathia vellosa</i>	+		
<i>Gnathia virginalis</i>	+		
Oniscidea			
Family Ligiidae			
<i>Ligia baudiniana</i>			+
Family Philosciidae			
<i>Littorophiloscia culebrae</i>			+
Family Tylidae			
<i>Tylos niveus</i>		+	+
<i>Tylos wegeneri</i>			+
Valvifera			
Family Astacillidae			
<i>Arcturella spinata</i>	+		
<i>Astacilla cymodocea</i>	+		
<i>Astacilla marna</i>		+	
<i>Astacilla tayronae</i>	+		
<i>Astacilla</i> sp.			+
<i>Edwinjoycea horologium</i>	+		
Family Idoteidae			
<i>Cleantioides occidentalis</i>	+		
<i>Cleantioides planicauda</i>	+		
<i>Edotia samariensis</i>	+		
<i>Erichsonella filiformis</i>	+	+	+
<i>Idotea metallica</i>			+

terolateral angles of cephalon acute; eyes well-pigmented. Body nearly glabrous with few scattered setae on margins of pereonites. Pleotelson width 1.3 times length, lateral margins with 3 teeth and several setae, apex narrowly rounded.

Antennule, basal article longest and widest with transparent dentate flange on outer distal angle; articles 2–4 with few setae; terminal article with 2 aesthetascs and four simple setae. Antennal article 4 largest; transparent fringe on outer margins of articles 4 and 5; flagellum of 8 setose articles. Mandibular palp of 3 articles, article 2 having 3 distal fringed spines, article 3 with 5 distal fringed spines; spine row of 9 spines on both mandibles, blunt projection between 7th and 8th spines on left mandible only; molar slender, tapering. Maxilla 1, inner ramus with 3 slender terminal setae and several fine setules; outer ramus with 12 stout dentate spines. Maxilla 2, inner ramus with 3 simple setate and several setules distally; both lobes of outer ramus bearing one simple and 3 fringed setae. Maxillipedal endite broad, bearing 3 coupling hooks, distolateral margin weakly serrate, mediodistally emarginate with 2 widely separated flattened spines; palp of 5 articles, penultimate article longest. Pereopods typical for genus, except pereopod 7 having anterodistal margin of merus strongly serrate. Pleopods 1 and 2 as figured. Uropod with mediodistal angle curved and acute; inner ramus bearing 2 plumose and several simple setae; outer ramus shorter with long and short setae.

Female: Operculum, proximal half with broadly convex margins, distal half tapering to apex bearing 4 setae.

Remarks.—*Joeropsis tobagoensis* resembles the Caribbean species *J. coralicola* Schultz & McCloskey, 1967, and *J. rathbunae* Richardson, 1902. Both of these are much more setose than *J. tobagoensis*, have serrated margins of the pleotelson, and reticulated pigment over the entire body. The rostrum, which has an evenly convex an-

terior margin, differs from that of *J. coralicola* which has a slightly indented anterior margin.

Etymology.—The specific epithet derives from the type locality, Tobago.

Family Munnidae

Munna caprinsula, new species

Figs. 2, 3

Material.—Holotype, USNM 252767, ♂ tl 1.0 mm, Allotype, USNM 252768, ♀ tl 1.2 mm, Paratypes, USNM 252769, 7 ♀, Goat Island, Tobago, tube sponge, 4–5 m, coll. RH, 14 Jan 1993.—Paratypes, USNM 252770, 2 ♂, 2 ovig. ♀, 2 ♀, sta 8, east side of Man o' War Bay, Tobago, rocky intertidal, coll. RH, 6 Apr 1992.

Diagnosis.—Pleotelson longer than wide. Pereopod 1 in male carpochele, carpus broad, with bidentate process at postero-distal angle. Pleopod 1 in male, mesial lobes of rami having very obtuse angle.

Description.—Male: Body almost 3 times longer than wide, pereonite 1 wider and longer than all other pereonites. Several setae on dorsum and lateral margins. Head with straight anterior margin bearing 6 setae; eyes on short stalks, with few ommatidia. Pleon of one short segment and globose pleotelson, longer than wide, dorsally sparsely setose, posteriorly rounded.

Antennule of 7 articles, single aesthetasc on distal 2 articles; article 2 with single setose spine distally. Antenna missing in all specimens. Mandibular palp 3-segmented, terminal article with 3 distal spines and two medial rows of combed spines; molar process distally truncate, nor serrate; spine row of 4 spines; lacinia mobilis with 4 cusps, incisor of 4 cusps. Maxillae typical of genus. Maxilliped, article 2 of palp largest, all articles bearing setae; endite with 3 retinaculae and several setae; distal margin truncate with 5 fringed spines, 3–4 submarginal feather setae, and 3 simple spines. Pereopod 1 carpochele, length of propodus, carpus and merus combined somewhat less than ½

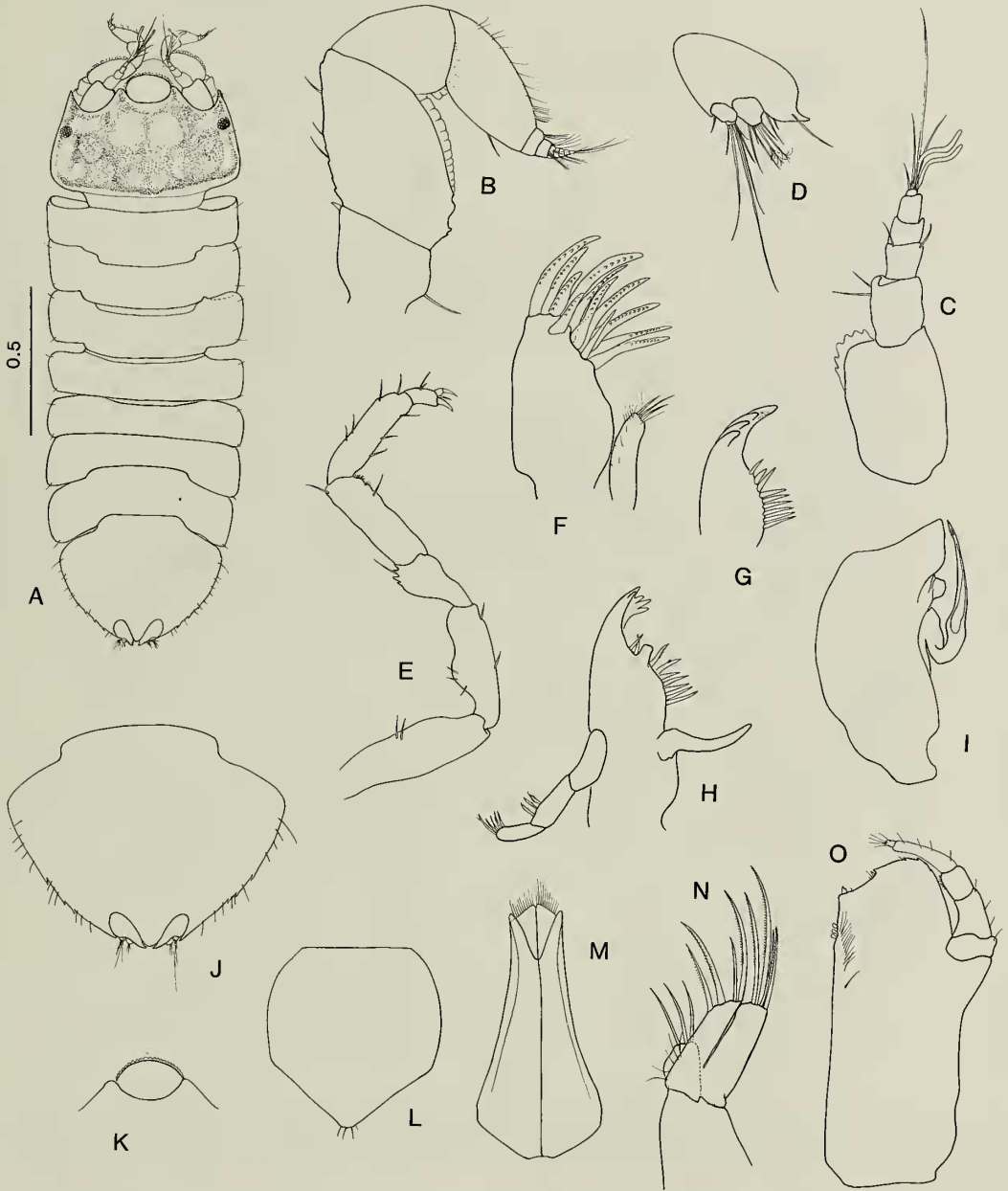


Fig. 1. *Joeropsis tobagoensis*. A, male in dorsal view; B, antenna; C, antennule; D, uropod; E, pereopod 7; F, maxilla 1; G, right mandible; H, left mandible; I, male pleopod 2; J, pleotelson; K, rostrum; L, female operculum; M, male pleopod 1; N, maxilla 2; O, maxilliped.

length of body; merus widening distally; carpus widening distally into bidentate process, single spines at anterodistal angle; propodus nearly as wide as long; dactylus

about 3.5 times as long as wide, barely reaching distal margin of carpus, unguis long and slender. Pereopods 2-7 slender with sensory spines on margins of carpi and

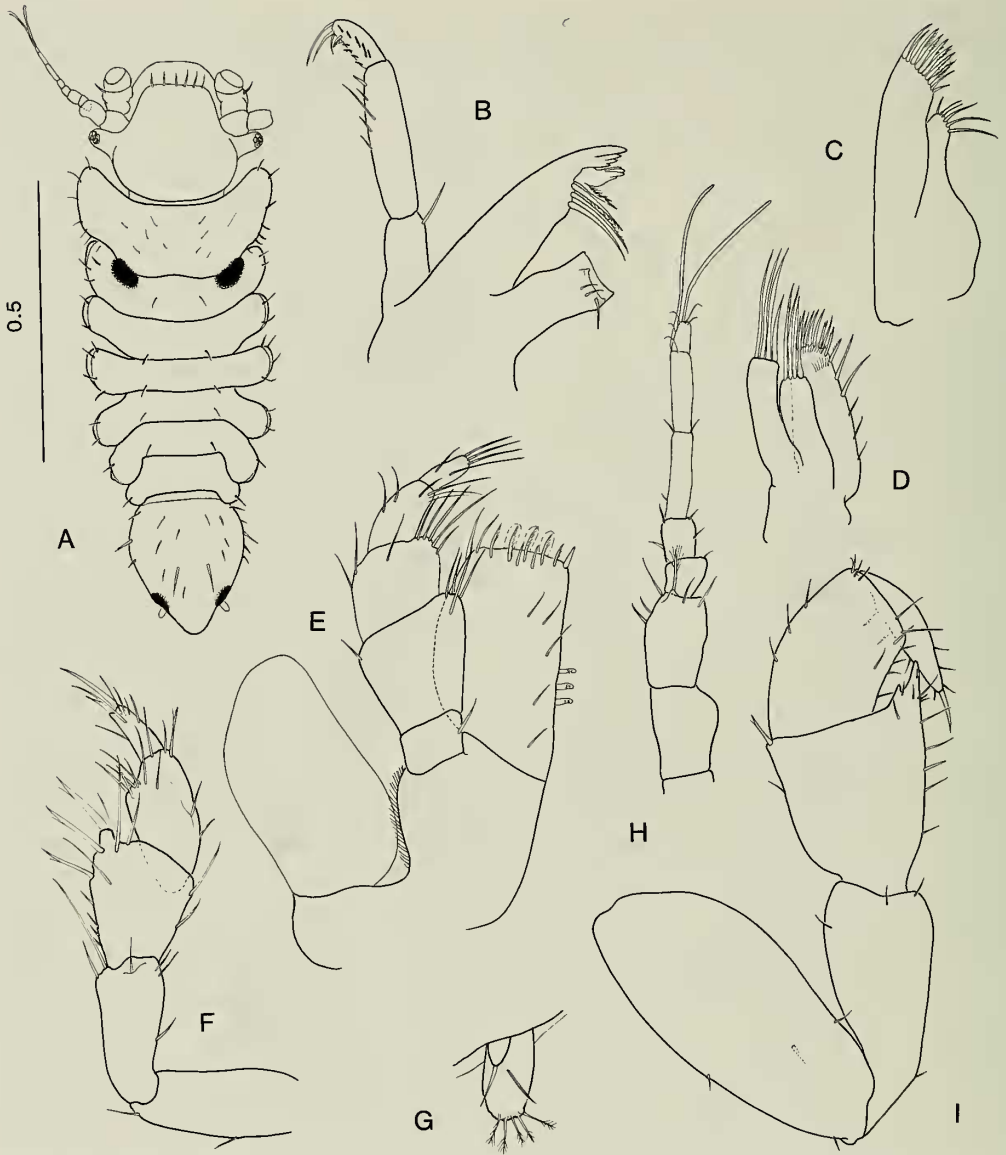


Fig. 2. *Munna caprinsula*. A, male in dorsal view; B, mandible; C, maxilla 1; D, maxilla 2; E, maxilliped; F, pereopod 1 ♀; G, uropod; H, antennule; I, pereopod 1 ♂.

propodi; dactyli biunguiculate with single seta between slender ungui. Pleopod 1, rami fused for about $\frac{2}{3}$ of length, inner distal lobe bearing about 6 setae, outer lobe acute, triangular. Pleopod 2, outer ramus with about 12 simple setae on surface and fine fringe on outer margin; inner ramus tapering, extending just beyond apex of outer ramus.

Pleopod 3, outer ramus with about 5 setae on surface, inner ramus much shorter and bearing 3 distal plumose setae. Pleopod 4, outer ramus broadly triangular, inner ramus slender with 2 distal plumose setae. Uropod, longer ramus parallel-sided with rounded apex bearing about 5 setae; smaller ramus much shorter with one seta.

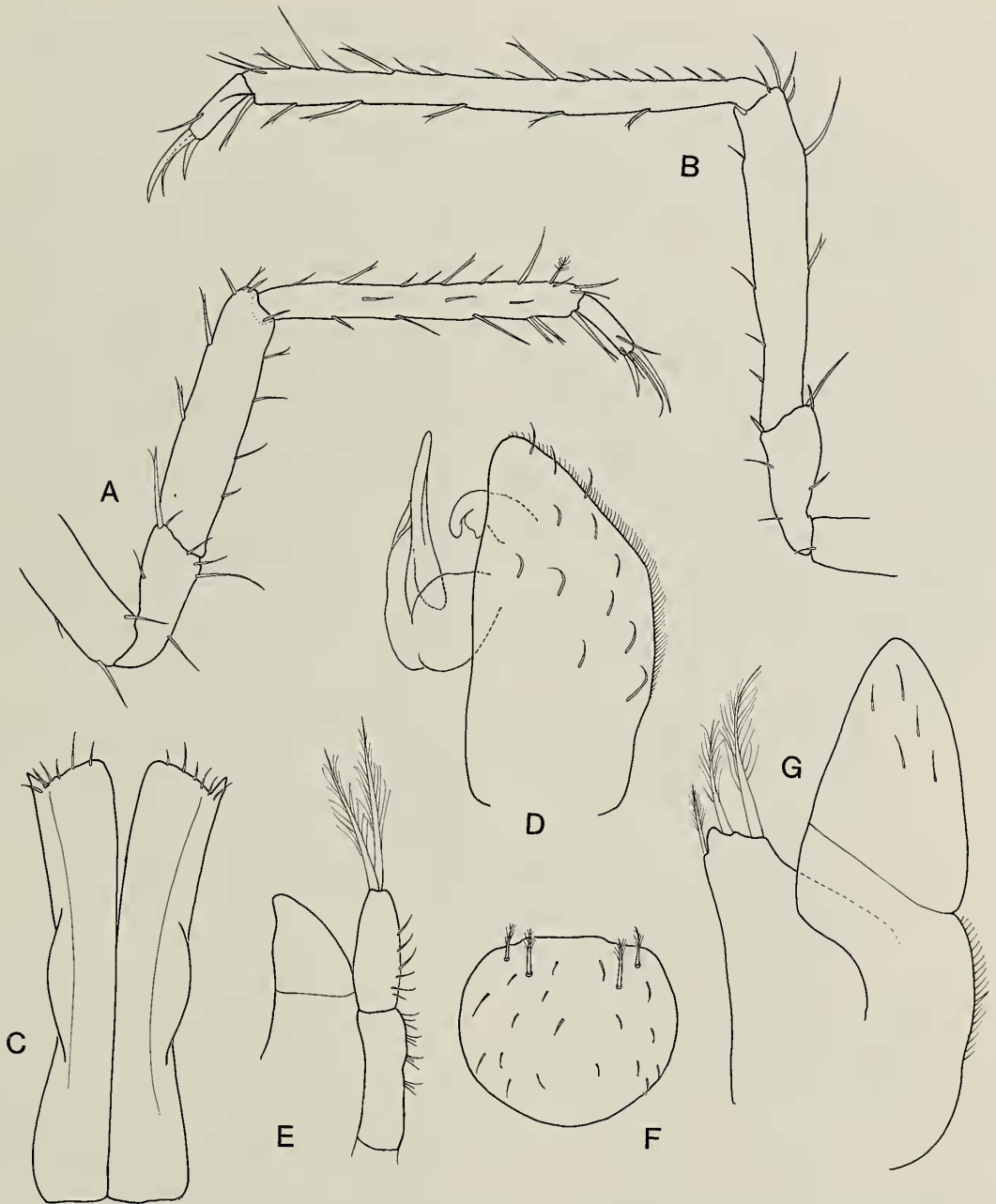


Fig. 3. *Munna caprinsula*. A, pereopod 2; B, pereopod 7; C, pleopod 1; D, pleopod 2; E, pleopod 4; F, operculum; G, pleopod 3.

Female: Body ovate, widest at pereonite 4; pereonite 1 not enlarged as in male. Pereopod 1 shorter than other legs; carpus extended distally with 3 sensory spines at or

near anterodistal angle; propodus with single sensory spine at posterodistal angle; dactylus biunguiculate, anterior unguis longer than posterior. Operculum wider than long,

almost oval, dorsal surface setose with two pairs of stout, setose spines near proximal margin.

Color. — Pigment somewhat variable; several specimens with large, brown pigment spots at anterior margin of pereonite 2; smaller patches on distolateral pleotelson near uropods; some specimens with pigment only on pleotelson, some with no coloration.

Remarks. — *Munna caprinsula* most closely resembles another Caribbean congener, *M. petronastes* Kensley, 1984, from Belize, but differs in pigment pattern and in the morphology of the first pereopod of the male. All other munnids from the western Atlantic are in the genus *Uromunna*, which lacks mandibular palps and has a single aesthetasc on the antennule.

Etymology. — The specific epithet is derived from the Latin, *capri*, goat, and *insula*, island, and refers to the type locality.

Suborder Flabellifera

Family Cirolanidae

Anopsilana sinu, new species

Figs. 4–6

Material. — Holotype, USNM 252771, 1 ovig. ♀ tl 6.0 mm, Allotype, USNM 252772, 1 ♂ tl 7.9 mm, Paratypes, USNM 252773, 79 ♂, 19 ovig. ♀, 100+ non-ovigerous ♀ & juv., from mussel-covered mangrove roots in drainage canal of Rio Sinu between Cienaga Soledad and Bahia de Cisputan, about 2 miles from seacoast, < 1 m depth in brackish water of 10–25 ppm, coll. RL & DF, 25 Oct 1992.

Diagnosis. — Body length more than 3 times greatest width. Frontal lamina rectangular, 1.7 times longer than wide. Uropodal exopod having 7 spines on lateral margin; uropodal endopod having 2 spines on lateral margin, 5 spines on mesial margin. Pleotelsonic apex having 10 spines.

Description. — Scattered pigment, frequently dense, on all somites and uropods, most concentrated toward posterior mar-

gins of pereonites and pleonites. Length of largest specimen 7.9 mm. Body length more than 3 times width. Anterior margin of cephalon produced into small rostrum separating bases of antennae 1, and ventrally, appearing to insert into anterior edge of frontal lamina. Latter rectangular, length about 1.7 times width. Clypeus as deep as width of frontal lamina. Pereonite 1 longest, pereonites 2–6 gradually increasing in length, pereonite 7 somewhat shorter than 6. Posterior edges of coxae 2–3 rounded, 4–7 acute; coxa of pereonite 7 reaching beyond pleonite 1; all coxae with oblique carinae. Pleonites 1–4 subequal in length, 5 longest; pleonite 1 partly overlapped by pereonite 7; pleonite 5 overlapped laterally by pleonite 4; epimera of pleonites 1–3 pointed, of pleonite 4, rounded. Pleotelson triangular, slightly longer than wide, rounded apically, armed with 10 spines and many interspersing setae.

Antennule reaching to midpoint of pereonite 1, flagellum with 11 articles and 8 aesthetascs in male. Antenna nearly reaching pereonite 4, flagellum with 19 articles. Mandible as figured, tricuspid. Exopod of maxilla 1 with 12 spines, 2 with accessory spinules, endopod with 3 plumose spines. Maxilla 2 with 5 and 8 setae on palp and exopod respectively; endopod with 11 setae, some plumose. Maxilliped with one coupling hook. Pereopods as figured, with 1 plumose seta each on ischium and basis. Pereopod 7 as figured. Pleopod 1 with 4 hooks and 2 setae on protopod, stout simple seta on proximolateral margin of exopod; protopod of pleopod 2 bearing 3 hooks and 3 plumose setae, copulatory stylet tapering to rounded apex, nearly twice length of endopod. Pleopod 3 with 3 hooks, 3 plumose setae and 3 simple setae on protopod. Pleopod 4 having 3 hooks and 2 setae on protopod; pleopod 5 as figured. Uropods reaching beyond apex of pleotelson; exopod with 7 spines on lateral margin, 3 on mesial margin. Endopod longer than exopod, with 5 mesial and 2 lateral spines.

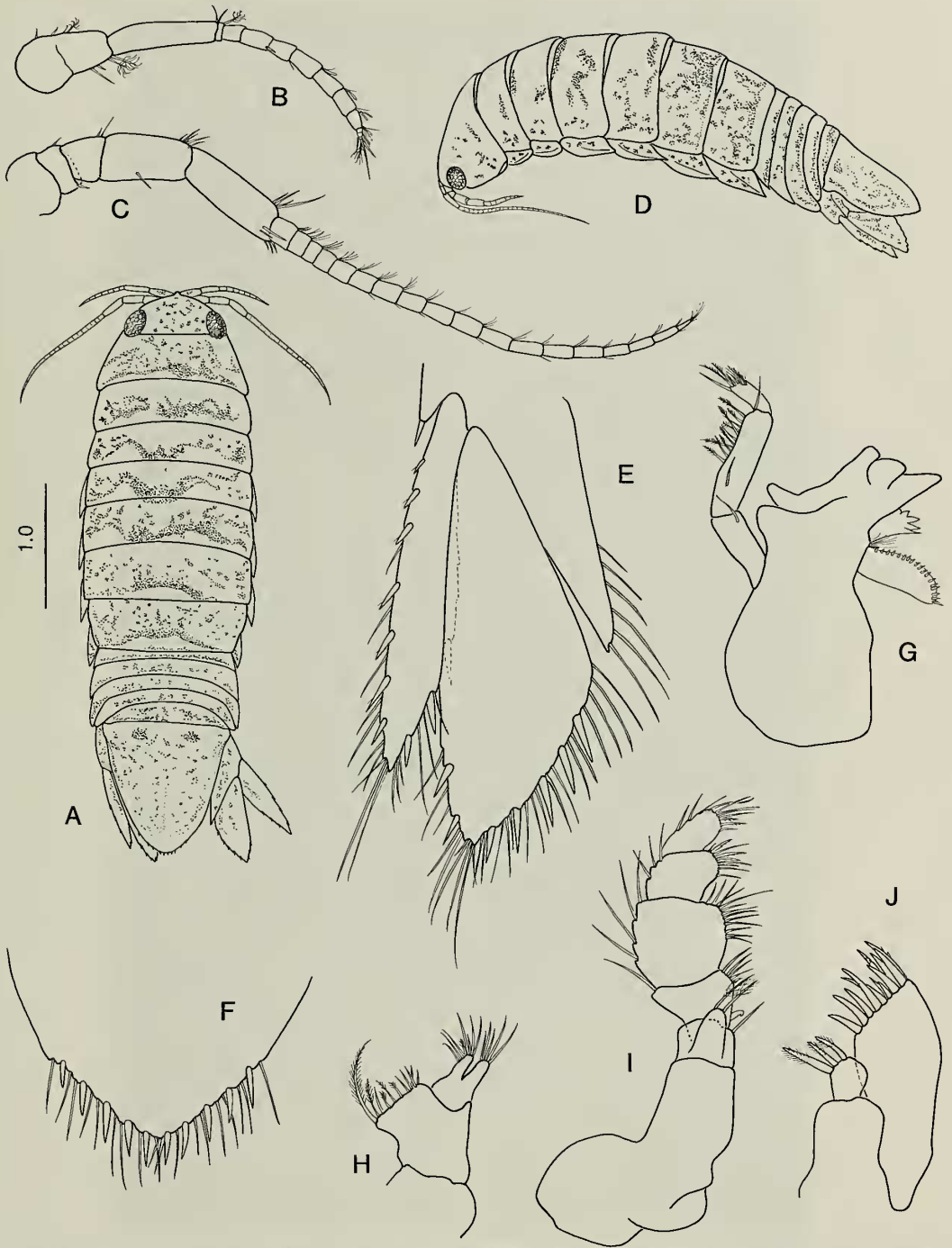


Fig. 4. *Anopsilana sinu*. A, male in dorsal view; B, antennule; C, antenna; D, male in lateral view; E, uropod; F, apex of pleotelson; G, mandible; H, maxilla 2; I, maxilliped; J, maxilla 1.

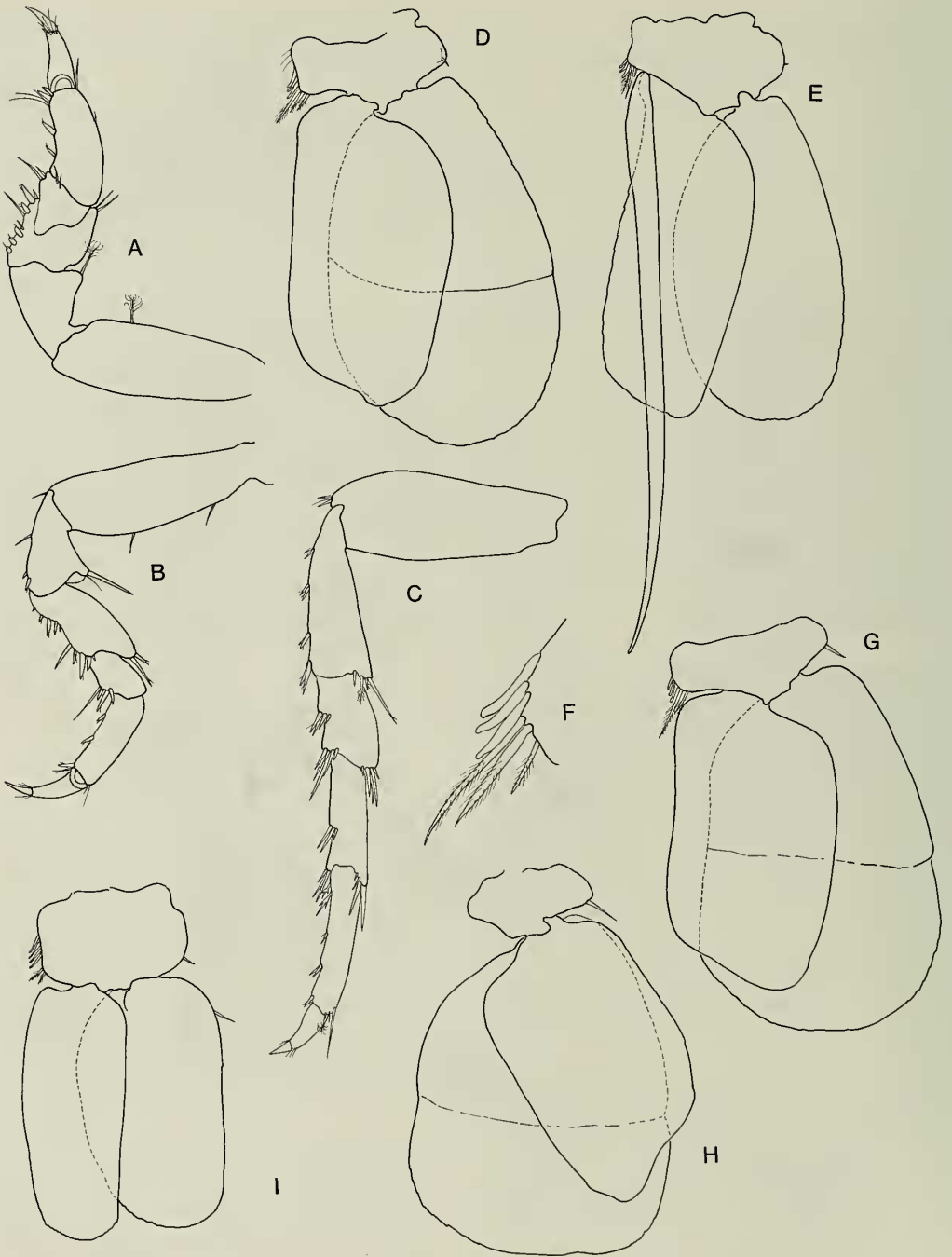


Fig. 5. *Anopsilana sinu*. A, pereopod 1; B, pereopod 2; C, pereopod 7; D, pleopod 3; E, pleopod 2 ♂; F, coupling hooks and setae of pleopod 1 protopod enlarged; G, pleopod 4; H, pleopod 5; I, pleopod 1.

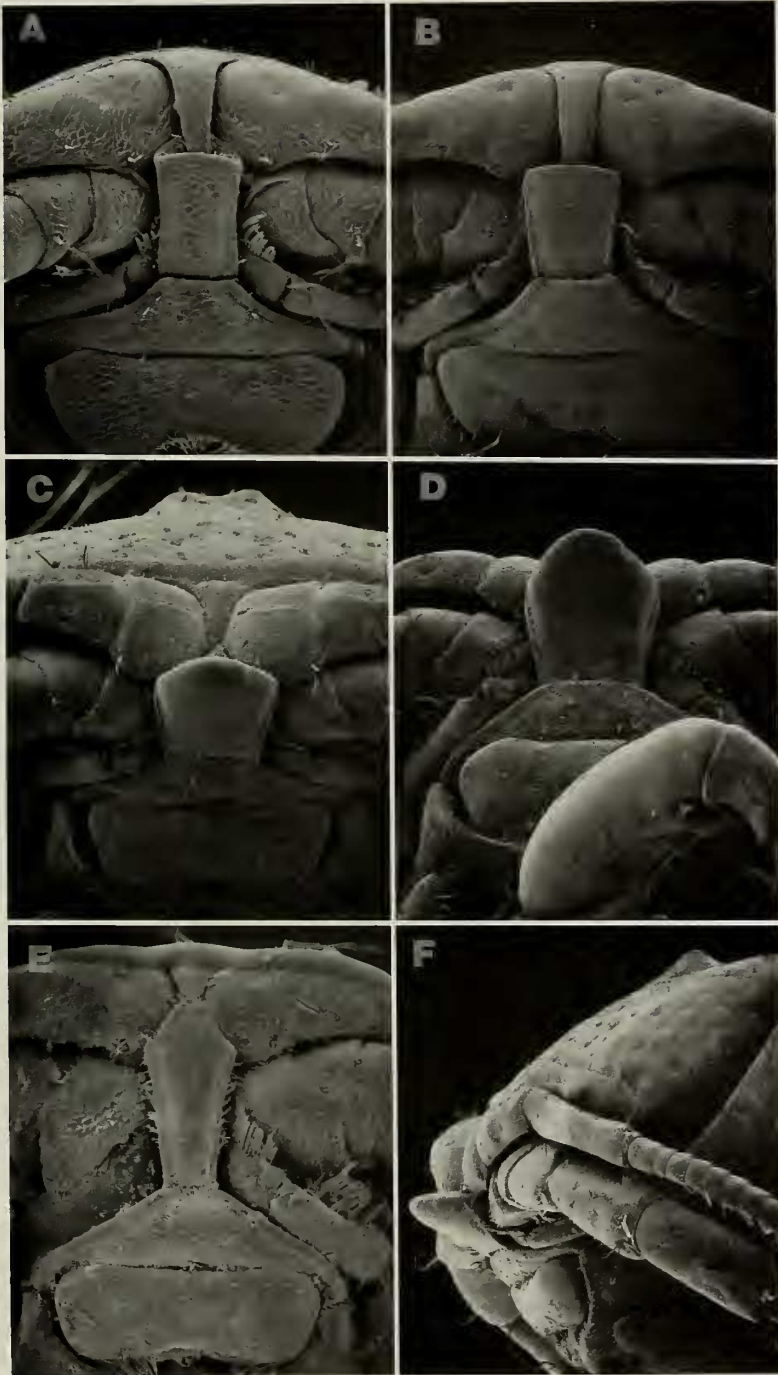


Fig. 6. A, *Anopsilana sinu*, frontal lamina and clypeus; B, *Anopsilana oaxaca*, frontal lamina and clypeus; C, *Anopsilana browni*, frontal lamina and clypeus; D, *Anopsilana browni*, frontal lamina and clypeus from more ventral position than in C; E, *Anopsilana jonesi*, frontal lamina and clypeus; F, *Anopsilana browni*, lateral view of anterior cephalon.

Remarks.—Of the 14 known species of *Anopsilana*, six are blind and are found in caves, wells, or springs. The present new species can be separated from the remaining non-anchialine Atlantic and eastern Pacific congeners (except *A. oaxaca* Carvacho & Haasmann, 1984), by the morphology of the frontal lamina. In *A. jonesi* Kensley, 1987 (from Belize), the frontal lamina is pentagonal, while the projecting, rounded frontal lamina of *A. browni* (Van Name, 1936) (from Cuba, Belize, and Pacific Costa Rica) clearly identifies that species. The new species from the Caribbean is obviously very closely related to *A. oaxaca* from the Pacific coast of Mexico. The frontal laminae are similar when viewed with a light microscope. Scanning electron microscopy, however, reveals that the frontal lamina of *A. oaxaca* is nearly square, with a length/width ratio of 1.2 instead of 1.7, and is slightly widened distally. *Anopsilana oaxaca* is stouter in shape, with the body length 2.5 times the maximum width. Differences between the two species can be seen in spination of the uropods, the number of articles of the antennal and antennular flagellae (fewer in the new species in all cases), in the number of setae on maxilla 2, the shape of the apex of the pleotelson (more narrowly rounded in *A. oaxaca*) and in the general pigmentation pattern. The copulatory stylet is proportionately longer in *A. sinu*: 25–35% longer than the endopod in *A. oaxaca* and nearly twice the endopodal length in the new species. Given these subtle yet consistent differences, *Anopsilana oaxaca* and *A. sinu* may represent geminate species on either side of the Central American isthmus.

Etymology.—The specific epithet is taken from the type locality, the Rio Sinu, Colombia.

Family Sphaeromatidae

Paraimene charlesae, new species

Figs. 7, 8

Material.—Holotype, USNM 252774, ♂ tl 3.1 mm, Paratypes, USNM 252775, 2

ovig. ♀, tl 3.1 mm, 2 juv., sta K-DOM-19, Grand Bay, Dominica, algal turf including branching corallines and *Dictyota*, on boulders, 0.5 m, coll. BK & MS, 18 Nov 1992.—USNM 252776, 1 juv., sta K-DOM-1, Portsmouth, Dominica, encrusting algae on intertidal concrete blocks, coll. BK, 22 Mar 1989.—USNM 252777, ovig. ♀ tl 3.0 mm, sta K-DOM-4, Calabishie, Dominica, intertidal/shallow infratidal algal turf on beachrock platform, coll. BK, 22 Mar 1989.—USNM 252778, 4 ♀ tl 3.1 mm, sta K-DOM-15, Scots Head, Dominica, algal turf on subtidal boulders, coll. BK & MS, 17 Nov 1992.—USNM 252779, 7 juv., Man o' War Bay, Tobago, 1 m plankton tow, coll. R. Heard, 6 Apr 1992.

Diagnosis.—Pleotelson of male basally inflated with one pair of small, and 2 pairs large rounded tubercles. Pleotelson of female having only 2 pairs of rounded tubercles; apex narrower than in male. Accessory dactylar spine of pereopods bilobed. Copulatory stylet of pleopod 2 in male slender, reaching by half its length beyond apex of endopod. Uropodal endopod of female with short mesiodistal lobe.

Description.—Mature male: Body length about 1.9 times greatest width; dorsal integumental surface smooth, with few scattered short setae. Cephalon roughly semi-circular, domed, lacking ridges, tiny rostral point not visible dorsally; epistome anteriorly broadly rounded, with short diverging arms embracing labrum; eyes large, dorso-lateral. Pereonal tergites unornamented; pereonite 6 with posteriorly projecting trilobed narrow ridge; pereonite 7 unornamented, much shorter than, and overlapped laterally by 6. Pleon consisting of single short free pleonite plus pleotelson, latter anteriorly bulbous, bearing one small and 2 large tubercles on each side; posterior half tapering rapidly to narrowly rounded apex.

Antennule with broad basal article subequal in length to articles 2 and 3; flagellum of 7 articles, equal in length to 2 distal peduncle articles, second flagellar article with 2 aesthetascs, articles 3–5 each with single

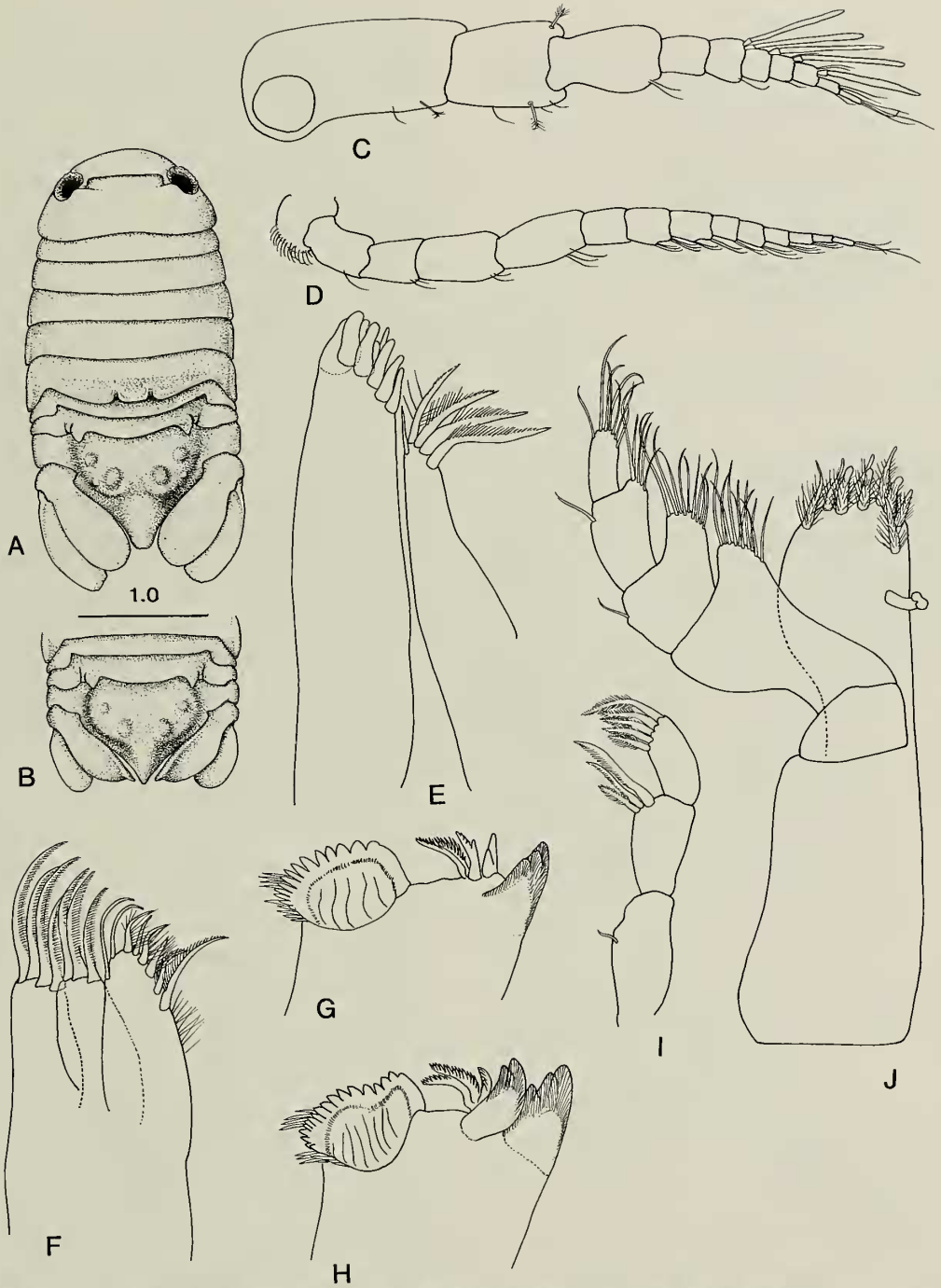


Fig. 7. *Paraimene charlesae*. A, male in dorsal view; B, female pleon in dorsal view; C, antennule; D, antenna; E, maxilla 1; F, maxilla 2; G, left mandible; H, right mandible; I, mandibular palp; J, maxilliped.

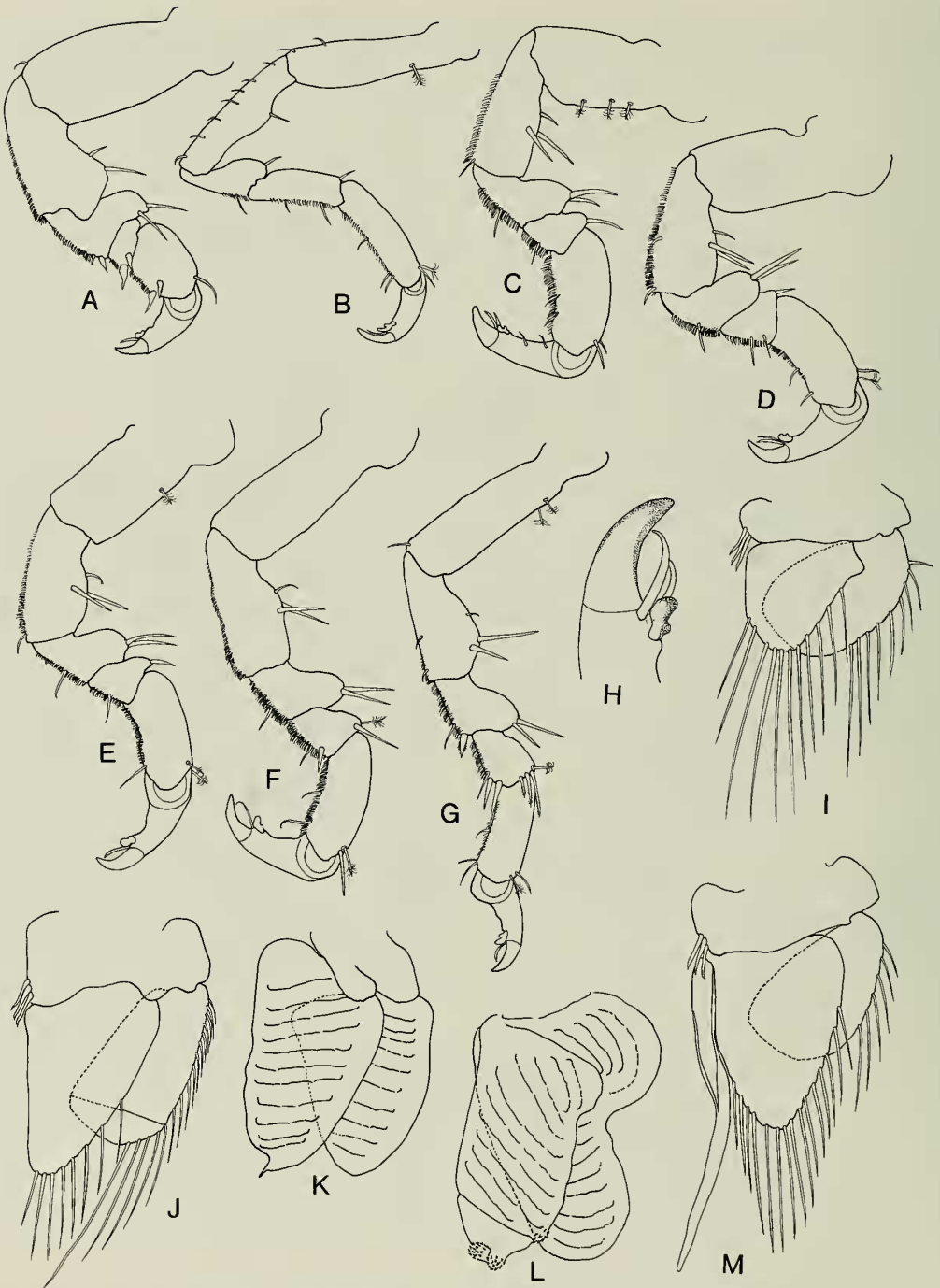


Fig. 8. *Paramimene charlesae*. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pereopod 6; G, pereopod 7; H, pereopodal dactylar unguis and accessory spine; I, pleopod 1; J, pleopod 3; K, pleopod 4; L, pleopod 5; M, pleopod 2.

aesthetasc. Antenna subequal in length to antennule, peduncular articles relatively slender, increasing in length distally; flagellum of 9 setose articles. Mandible with sclerotized incisor of 3 cusps; sclerotized lacinia mobilis of 2 cusps; spine row of 4 serrate to fringed spines; molar broad, truncate, with marginal teeth; palp of 3 articles, article with 3 distolateral fringed setae; article 3 with distolateral row of 5 fringed setae. Maxilla 1, inner ramus with 4 stout fringed setae; outer ramus bearing about 9 blunt nondentate spines. Maxilla 2, inner ramus with 6 fringed setae on distomesial margin and 2 simple setae distolaterally; both lobes of outer ramus bearing 4 curved fringed spines. Maxillipedal endite broad, with single coupling hook on mesial margin, distal margin bearing 9 stout fringed setae; palp of 5 articles, articles 2–4 each with well developed distomesial setose lobe. Pereopods increasing in length posteriorly, having short setulose pile on posterior surfaces of ischium, merus, carpus, and propodus. Pereopod 1 with merus, short carpus, and propodus each with 2 squat setae posterodistally; squat, broadly bilobed accessory spine at base of dactylus. Pereopod 2 markedly more slender than pereopods 1 or 3. Pereopods 3–7 essentially similar, with 3 setae on anterior surface of ischium, 2 on merus, one on carpus. Penes on sternite 7 short, stubby, distally rounded. Pleopod 1, basis short, with 3 distomesial coupling hooks; endopod roughly triangular, mesial margin straight; exopod elliptical. Pleopod 2, basis roughly rectangular, with 3 distomesial coupling hooks; endopod triangular, with narrow, tapering copulatory stylet articulating basally, twice length of ramus; exopod elliptical. Pleopod 3 basis broadly rectangular, with 3 distomesial coupling hooks; endopod triangular; exopod roughly elliptical with transverse suture in distal fifth. Pleopod 4, both rami membranous, having transverse pleats, endopod distally acute. Pleopod 5, both rami membranous, with transverse pleats, exopod with distal trans-

verse suture and 3 spinulose bosses. Uropodal rami subequal, distally rounded, reaching well beyond pleotelsonic apex.

Ovigerous female: Differing from male in lacking trilobed ridge on tergite of pereonite 6; bulbous anterior region of pleotelson with 2 rather than 3 tubercles on each side; pleotelsonic apex more narrowly acute than in male; uropodal endopod distomesially slightly lobed and upturned against pleotelson.

Color.—Dorsally with mottled or reticulate grey-brown pigment, pleotelson often solidly pigmented.

Remarks.—The present material agrees in several features with the diagnosis of *Paraimene Javed & Ahmed, 1988*, and with its single species *P. tuberculata* recorded from the coast of Pakistan. This agreement is seen in the mouthparts structure, the coxa of pereopod 6 almost completely overlapping that of 7, the bifid accessory dactylar spine of the pereopods, the structure of the penes, the pleotelsonic structure, the pleopods (including the structure of the copulatory stylet, the transverse suture of the exopod of pleopod 3, and the acute apex of the exopod of pleopod 4), and the uropods. Apart from specific differences in the pleotelsonic tuberculation, and the structure of the tergite of pereonite 6, two features that could be considered of generic importance require comment. In *P. tuberculata* the coxa of pereopod 7 is described as forming a dorsally curved narrow tubular structure overlapped by the coxa of pereopod 6. In the present species, the coxa of pereopod 7 is subtriangular, with its narrow apex just visible beyond the coxa of pereopod 6. The second pereopod in both male and female is markedly more slender and less sclerotized than either pereopods 1 or 3. This condition is less marked in juveniles. What the function of this modification can be, is unknown.

Each of the four samples of this species from Dominica came from dense algal turfs growing on concrete blocks, boulders, or flat

beachrock in the intertidal or shallow infratidal zone.

Etymology.—The species is named for The Honorable Mrs. Eugenia Charles, Prime Minister of Dominica, and strong supporter of nature conservation.

Pseudocerceis latistylis, new species

Figs. 9, 10, 11

Material.—Holotype, USNM 252780, ♂ tl 3.9 mm, Paratypes, USNM 252781, 3 ♂, tl 3.9 mm, sta K-DOM-11, Portsmouth, Dominica, algal turf on boulders, 2–3 m, coll. BK & MS, 16 Nov 1992.—Paratypes, USNM 252782, ♀ tl 3.4 mm, sta K-DOM-1, Portsmouth, Dominica, algal turf on intertidal concrete blocks, coll. BK, 22 Mar 1989.—Paratypes, USNM 252783, ♂ tl 3.6 mm, ♀ tl 3.9 mm, 4 juv., sta K-DOM-10, Portsmouth, Dominica, coral rubble between coral heads and boulders, 2–3 m, coll. BK & MS, 16 Nov 1992.—USNM 252784, 6 juv., sta K-DOM-21, Grand Bay, Dominica, rubble and coarse sediments between boulders, 2–3 m, coll. BK & MS, 18 Nov 1992.

Diagnosis.—Rounded apex of frontal lamina dorsally visible. Pleotelson in male basally inflated, bearing 3 ridges; apex notched. Pleotelson in female basally inflated, bearing 3 ridges; posterior region less expanded than in male, apex broadly rounded. Copulatory stylet of pleopod 2 in male basally broad, folded on itself. Uropodal exopod in male much longer than endopod, tapering to narrowly rounded apex. Uropodal exopod in female lamellar, subequal to endopod.

Description.—Mature male: Body length about 2.5 times greatest width; dorsal integumental surface irregularly rugose. Cephalon roughly semicircular, somewhat flattened, with low rounded lateral, and faint anteromedian ridge; epistome of cephalon anteriorly narrowing to subcircular dorsally-visible apex; eyes large, dorsolateral. Pereonal tergites lacking ridges or ornamentation;

pereonite 1 about twice length of 2; pereonites 2–7 subequal in length. Pleon having 2 lateral incisions demarking fused pleonites; broad anterior half having series of low rounded lateral and submedial ridges posteriorly, median region unridged; posterior half having low rounded median, and pair of smaller lateral bosses. Pleotelson with anterior half broadly rounded, with median and two lateral ridges defining central area; posterior half having narrow rounded raised area, posterior margin broadly notched.

Antennule with broad basal article subequal in length to following 3 articles, article 3 narrow-elongate; flagellum of 7 articles, articles 4–6 each having single aesthetasc, terminal article bearing 2 aesthetascs. Antenna subequal in length to antennule, peduncular articles relatively slender, increasing in length distally; flagellum of 8 articles. Mandible with sclerotized incisor of 3 cusps; sclerotized lacinia mobilis of 3 cusps; spine row of 5 stout serrate spines; molar broad, truncate, with marginal teeth; palp of 3 articles, article 2 bearing 4 fringed distal setae, article 3 bearing row of 10 fringed setae increasing in length distally. Maxilla 1, inner ramus bearing 4 stout fringed apical setae; outer ramus bearing about 9 dentate apical spines. Maxilla 2, inner ramus with 7 fringed setae distally; inner and outer lobe in outer ramus each with 6 distal dentate spines. Maxillipedal endite broad, with single coupling hook on mesial margin, distal convex margin bearing about 7 short fringed setae; palp of 5 articles, 2–4 with well developed mesiodistal lobes bearing distal setae. Pereopods increasing in length posteriorly; pereopod 1, merus having pile of short setules and single fringed seta on posterior surface; carpus having almost no free anterior margin, having 2 fringed setae on posterior margin; propodus bearing 2 fringed setae on posterior margin; dactylus having short strong tooth at base of unguis. Pereopods 2–7 similar, with merus, carpus and propodus having pile of short setules and 2 more elongate setae on posterior margins; dactyli

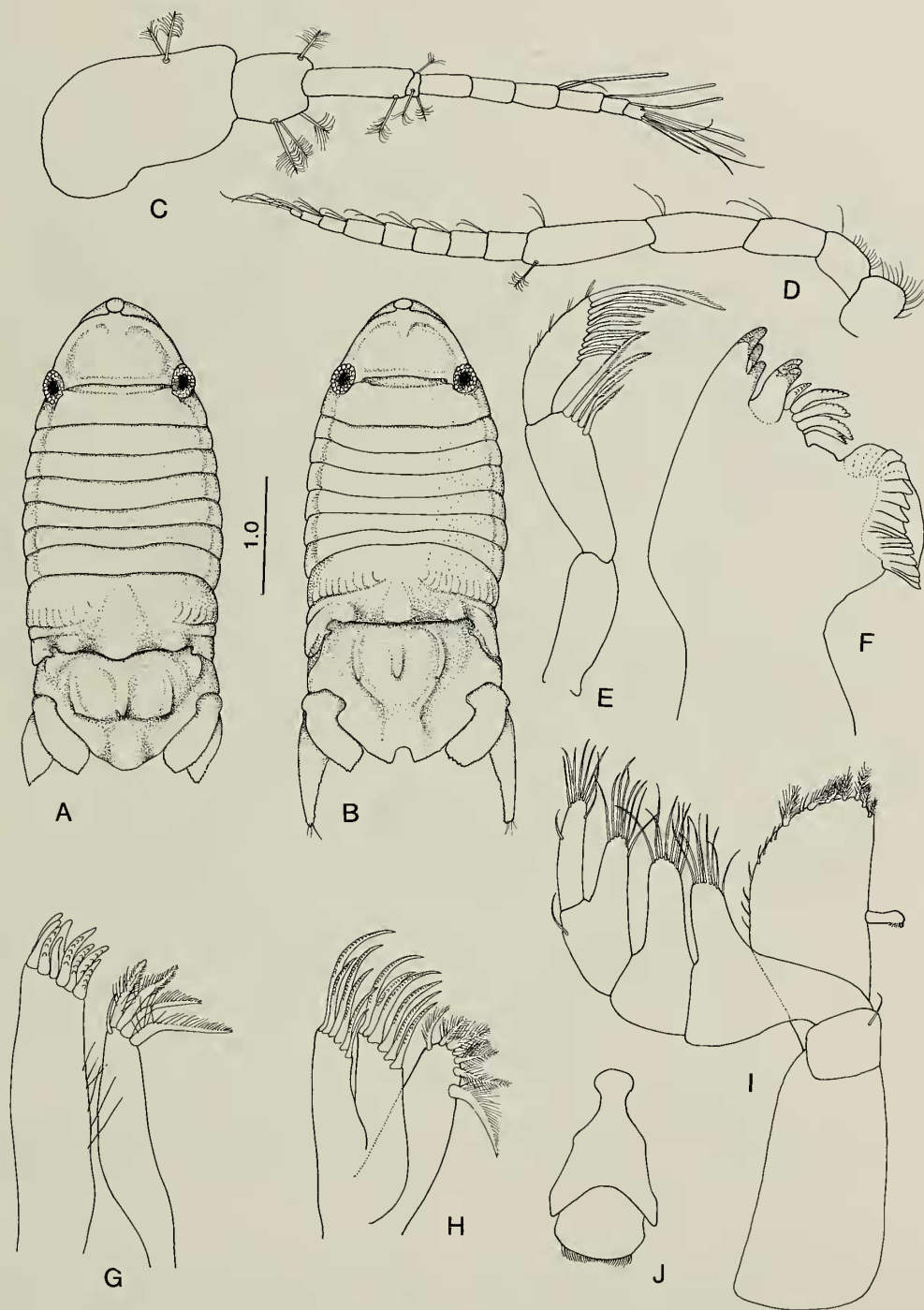


Fig. 9. *Pseudocerceis latistylis*. A, female in dorsal view; B, male in dorsal view; C, antennulae; D, antenna; E, mandibular palp; F, mandible; G, maxilla 1; H, maxilla 2; I, maxilliped; J, frontal lamina and clypeus.

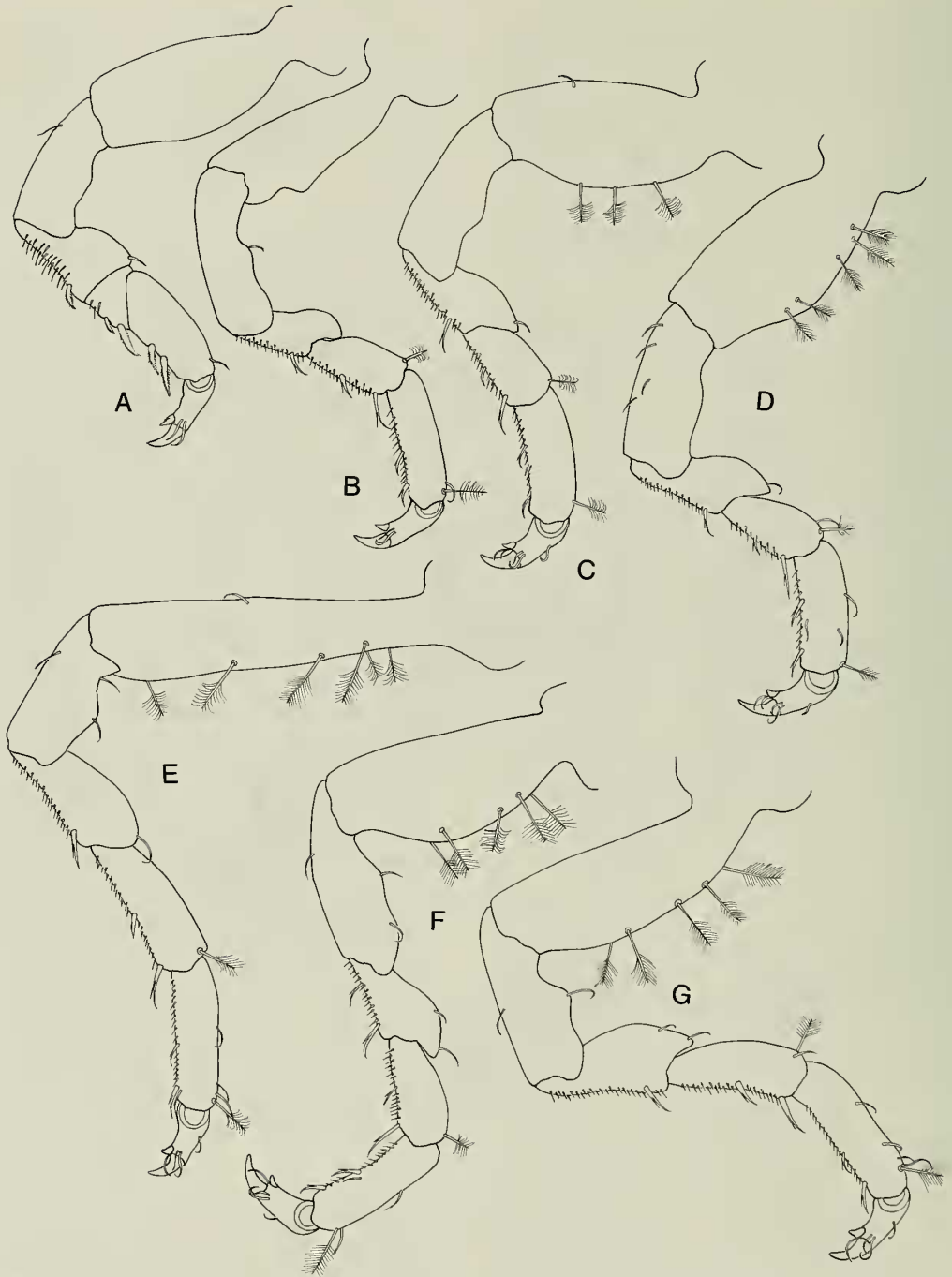


Fig. 10. *Pseudocerceis latistylis*. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 7; F, pereopod 5; G, pereopod 6.

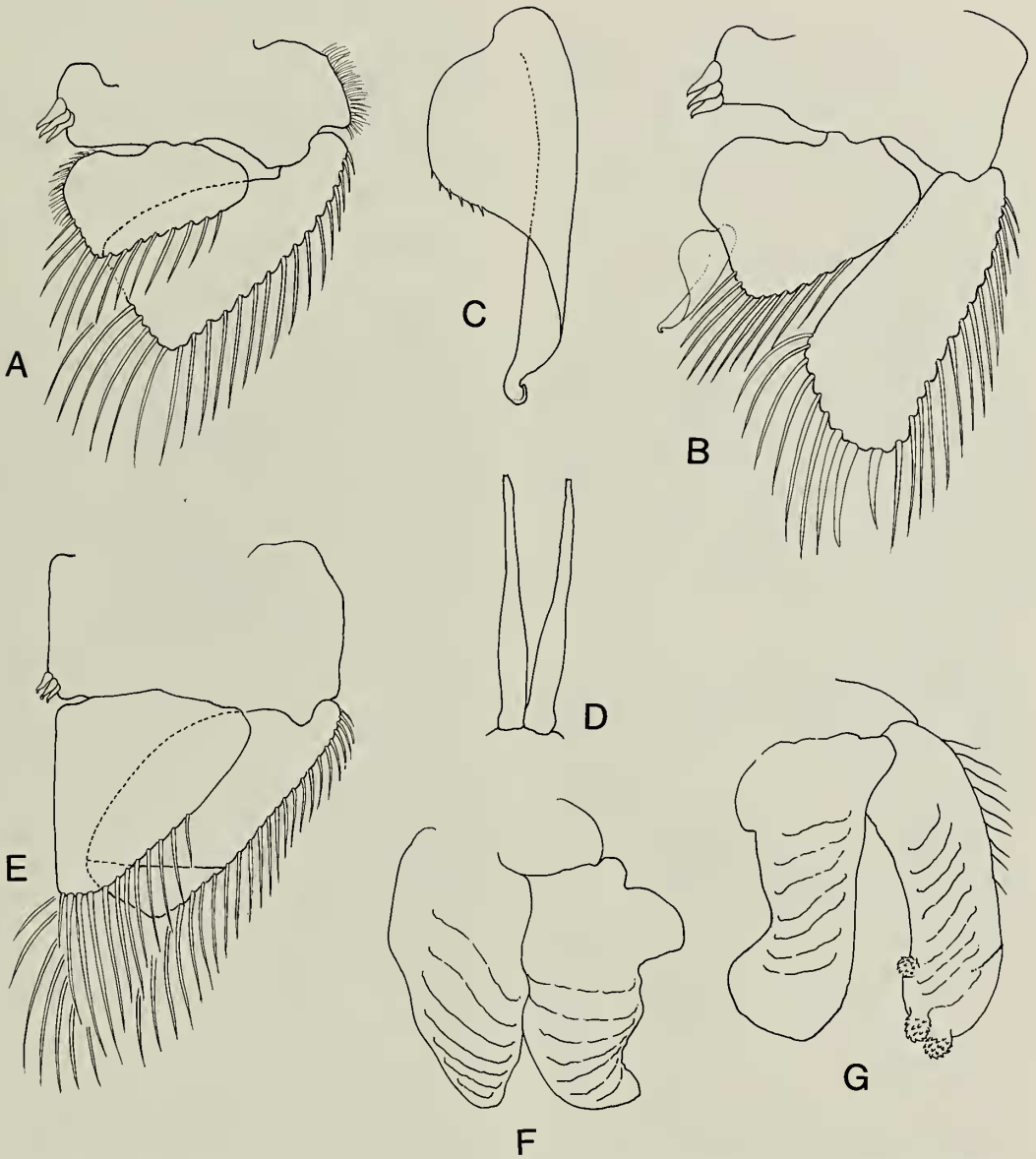


Fig. 11. *Pseudocerceis latistylis*. A, pleopod 1; B, pleopod 2 ♂; C, copulatory stylet enlarged; D, penes; E, pleopod 3; F, pleopod 4; G, pleopod 5.

having short strong accessory tooth at base of unguis. Penes on sternite of pereonite 7 elongate-slender, tapering, basally contiguous, separated from bases of pleopod 1 by transverse band of cuticle bearing elliptical region on each side of midline. Pleopod 1, basis broadly rectangular, with 3 mesiodis-

tal coupling hooks; endopod triangular, mesial margin straight; exopod elliptical, with oblique distal suture. Pleopod 2, basis with 3 mesiodistal coupling hooks; endopod bearing copulatory stylet at midlength of mesial margin, stylet having broad basal flap folding over open gutter of stylet, apex

rounded, slightly sclerotized; exopod elliptical, lacking transverse suture. Pleopod 3, basis with 3 mesiodistal coupling hooks; endopod much smaller than exopod, roughly elliptical but mesially truncate; exopod with mesial margin truncate, lacking transverse suture. Pleopod 4, both rami membranous, having transverse pleats. Pleopod 5, both rami membranous, having transverse pleats, exopod with incomplete distal transverse suture, bearing one subterminal and 2 terminal spinose bosses. Uropodal basis fused with endopod, latter distally flattened, reaching beyond level of pleotelsonic apex, distal margin somewhat truncate and finely but irregularly denticulate; exopod basally flattened, somewhat scooped, tapering distally, mesial margin finely denticulate, reaching by more than half its length beyond pleotelsonic apex.

Non-ovigerous female: Differing from male only in pleotelson, which lacking apical notch, and in uropod, in which flattened exopod not elongate as in male but subequal in length to endopod, distally acute, margins denticulate.

Remarks.—Using Harrison and Ellis's 1991 key to the sphaeromatid genera, the present species falls into the *Cerceis* group, characterized by the possession of a sternal cuticular band with submedial elliptical areas between the penes and the bases of pleopod 1. The character of the epistome being visible in dorsal view leads to the genus *Pseudocerceis*. The species does possess moderately dentate margins of pleopods 1–3, and generally agrees with the generic diagnosis (Harrison & Holdich 1982:428). The unusual structure of the copulatory stylet of pleopod 2, with its basally broadened and overlapping flap, is not seen in *Pseudocerceis*. Whether this feature is of sufficient strength to warrant the creation of a separate genus is unclear. *Pseudocerceis* is known from four species, from the intertidal of eastern and southern Australia, and East Africa. If indeed a *Pseudocerceis*, this is the

first record of the genus from the Atlantic Ocean.

Etymology.—The specific epithet is derived from the Latin *latus*—broad, plus *stylus*, referring to the broad-based copulatory stylet of the male second pleopod.

Sphaeromopsis heardi, new species

Figs. 12, 13

Material.—Holotype, USNM 252785, ♂ tl 2.0 mm, Paratypes, USNM 252786, 3 ♀ tl 1.7–1.9 mm; 2 juvs., sta K-DOM-1, Portsmouth, Dominica, algal turf on intertidal concrete blocks, coll. BK, 22 Mar 1989.—Paratype, USNM 252787, ♂ tl 2.0 mm, sta K-DOM-9, Portsmouth, Dominica, rubble between coral heads and boulders, 1–2 m, coll. BK & MS, 16 Nov 1992.—Paratypes, USNM 252788, ovig. ♀ tl 2.0 mm, sta K-DOM-26, Calibishie, Dominica, algal turf on intertidal beach rock, coll. BK & MS, 19 Nov 1992.—USNM 252789, 5 ♀ tl 1.9 mm, 4 juv., sta K-DOM-25, Calibishie, Dominica, rubble between boulders, 0.5 m, coll. BK & MS, 19 Nov 1992.—USNM 252790, 9 juv., Man o' War Bay, Lovers Beach, Tobago, coll. R. Heard, 6 Apr 1992.—USNM 252791, 26 juv., Buccoo Reef, Tobago, 1 m, coll. R. Heard, 11 Jan 1993.—USNM 252792, 40+ juv., Pigeon Point, Tobago, sand, 1 m, coll. R. Heard, 15 Jan 1993.

Diagnosis.—Cephalon and pereonites having somewhat rounded, strongly pitted ridge close to posterior margin. Pleotelson in male and female similar, basal half having 2 roughly rectangular raised areas bearing low scattered tubercles; posterior area smooth, apex evenly rounded.

Description.—Mature male: Body length about 1.9 times greatest width. Cephalon broader than long, moderately convex, rounded rostral projection visible in dorsal view; epistome linguiform, with apex contiguous with rostrum, dorsally visible; posterior margin between large pigmented eyes

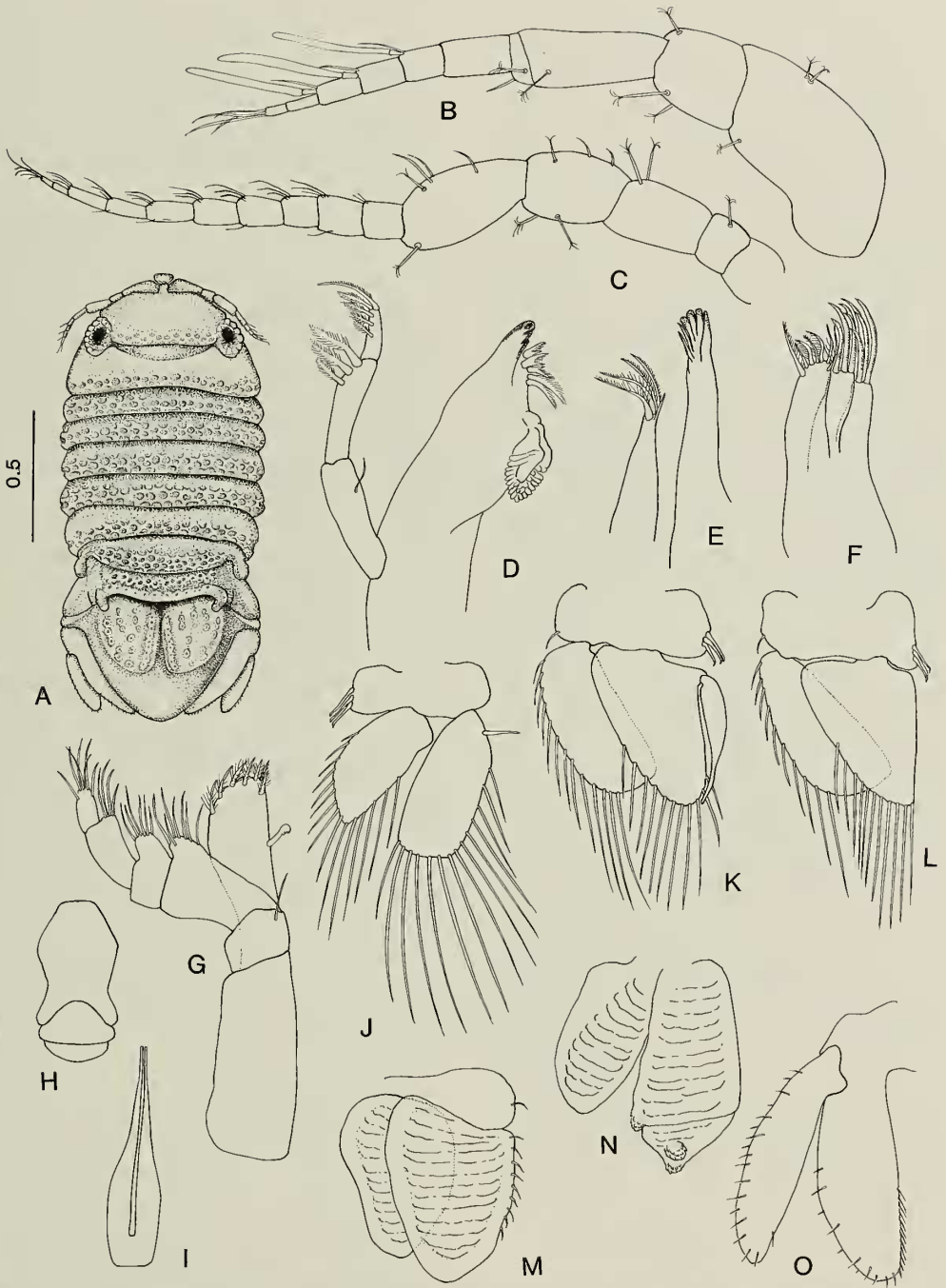


Fig. 12. *Sphaeromopsis heardi*. A, male in dorsal view; B, antennule; C, antenna; D, mandible; E, maxilla 1; F, maxilla 2; G, maxilliped; H, frontal lamina and clypeus; I, penis; J, pleopod 1; K, pleopod 2; L, pleopod 3; M, pleopod 4; N, pleopod 5; O, left uropod.

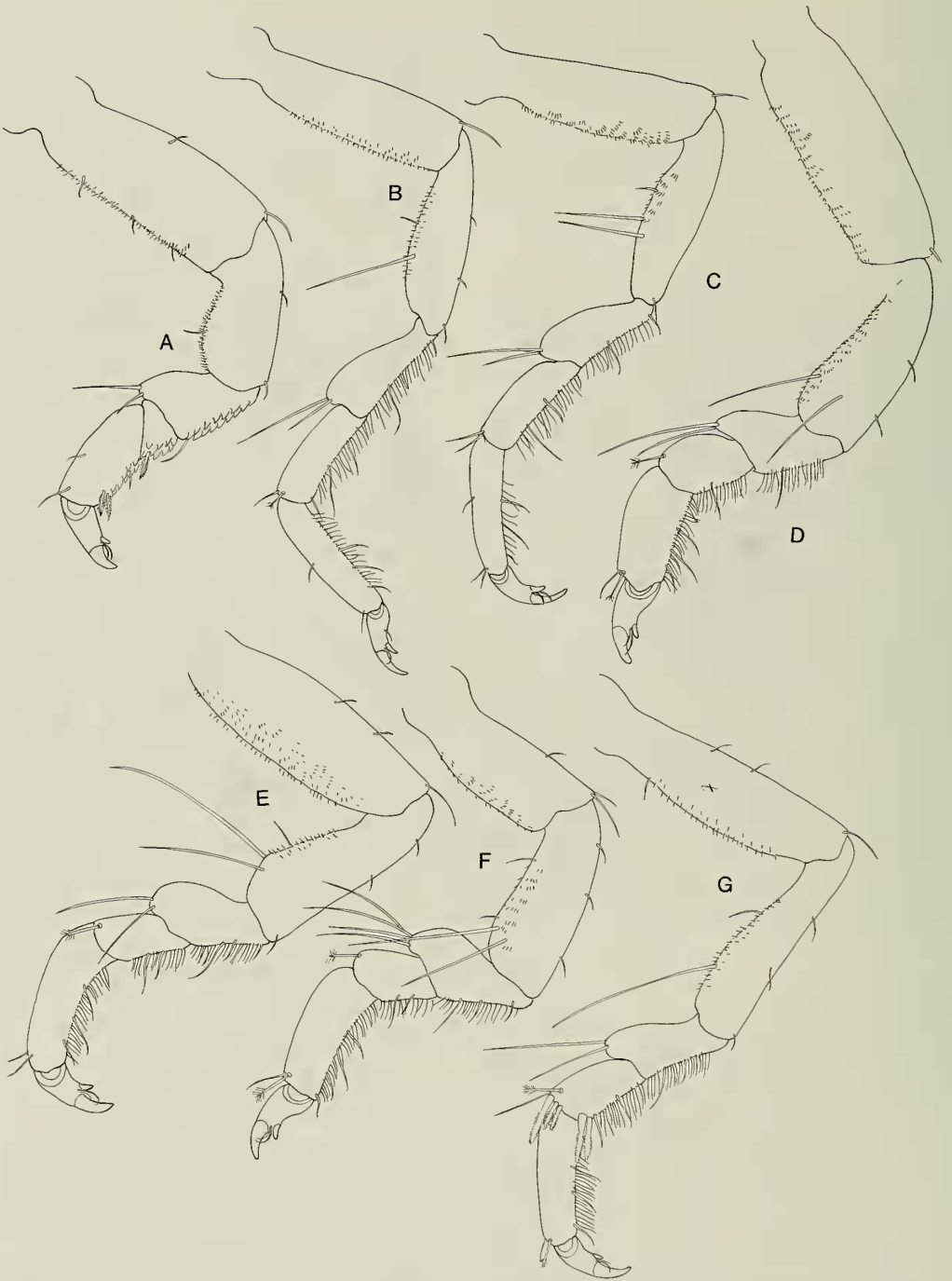


Fig. 13. *Sphaeromopsis heardi*. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 6; F, pereopod 5; G, pereopod 7.

rounded, pitted. Pereonal tergites each with transverse rounded and pitted ridge near posterior margin. Pleon with single free pleonite having 2 short suture lines reaching posterior margin, bearing two transverse pitted ridges. Pleotelson broadly triangular, apex broadly rounded; dorsally with 2 broad, raised subrectangular areas bearing scattered low pitted tubercles.

Antennule with broad basal article, proximally slightly flexed, subequal in length to articles 2 and 3 together; flagellum of 7 articles; articles 3–6 each bearing single aesthetasc. Antenna with peduncle articles 1 and 2 short, subequal, together subequal to article 3; articles 3 and 4 subequal, slightly shorter than article 5; flagellum of 10 setose articles. Mandible with sclerotized incisor of 3 cusps, spine row of 5 fringed spines, molar with numerous marginal teeth; palp with 3 distal fringed setae on article 2, 5 fringed setae on article 3. Maxilla 1, inner ramus with 4 fringed setae; outer ramus bearing 4 distally blunt spines plus several slender fringed spines. Maxilla 2, inner ramus with 7 setae on distal margin; both lobes of outer ramus bearing 4 curved fringed spines. Maxillipedal endite broad, with single coupling hook on mesial margin, distal margin bearing 7–9 stout fringed setae; palp of 5 articles, articles 2–4 each with low rounded setose distomesial lobe; article 5 short, setose. Pereopods increasing in length posteriorly, having short scattered setules on anterior margins of basis and ischium; pereopods 2–7 having pile of fine relatively elongate setules on posterior margins of merus, carpus and propodus. Pereopod 1, merus, carpus, and propodus with acute scales on posterior surface; carpus triangular, with very short free anterior margin, single posterodistal fringed seta; propodus with 2 posterodistal fringed setae; dactylus with short blunt accessory spine at base of unguis. Pereopod 2 longer and more slender than pereopod 1; pereopods 2–7 similar, ischium with 1 or 2 elongate setae on anterior margin; merus with 2–4 elongate setae on anterior margin. Pereopod 7, carpus having

several anterodistal and posterodistal stout fringed setae. Penile rami on sternite 7 basally fused, rami tapering to narrow apices. Pleopod 1, basis short, with 3 distomesial coupling hooks; endopod narrowly triangular, exopod roughly rectangular, with stout stiff seta proximally. Pleopod 2, endopod triangular, with narrow tapering copulatory stylet articulating basally, just reaching apex of ramus; exopod roughly rectangular. Pleopod 3, basis broadly rectangular, with 3 coupling hooks; endopod triangular; exopod roughly ovate. Pleopod 4, both rami having transverse pleats, basally broad, gently tapering to rounded apices. Pleopod 5, both rami having transverse pleats, exopod longer than endopod, with transverse suture distally, bearing 3 spinulose bosses. Uropodal rami subequal in length, endopod narrower than endopod, both rami apically rounded.

Female: Cephalon, pereon, and pleon as in male.

Remarks.—The genus *Sphaeromopsis* Holdich & Jones, 1973, contains four species, only one of which is from the Atlantic, viz. *S. mourei* (Loyola e Silva 1960) from Brazil (see Holdich & Harrison 1981). While agreeing with the Brazilian species in almost all details of the frontal lamina, mouthparts, and appendages, the present species, which is about half the size of *S. mourei*, can immediately be distinguished by the very distinctive ornamentation of the pleotelson, and by the pitted transverse ridges of the pereonal tergites.

Etymology.—The species is named for Dr. Richard Heard of the Gulf Coast Research Laboratory, Ocean Springs, Mississippi, respected colleague and indefatigable collector.

Suborder Valvifera
Family Astacillidae

Astacilla marna, new species
Figs. 14, 15

Material.—Holotype, USNM 252793, ♂ tl 3.5 mm, Paratypes, USNM 252794, 3 ♂

tl 3.5 mm, 2 ovig. ♀ tl 4.4 mm, ♀ tl 4.0 mm, 3 juv., sta K-DOM-20, Grand Bay, Dominica, algal turf with sponges on boulders, 3–5 m, coll. BK & MS, 18 Nov 1992.— Paratypes, USNM 252795, ♂ damaged, ovig. ♀ tl 4.9 mm, sta K-DOM-11, Portsmouth, Dominica, algal turf on boulders, 3–5 m, coll. BK & MS, 16 Nov 1992.

Diagnosis.—Male and female having single strong medial tubercle on cephalon. Pereonite 4 in male elongate, unarmed; in female having raised tuberculate area at about midlength. Pleon lacking free anterior pleonites. Antennal flagellum consisting of 3 spinose articles.

Description.—Male: Body elongate-cylindrical, geniculate, between pereonites 4 and 5. Integument sparsely setose. Cephalon with anterior margin concave, anterolateral lobes well produced, rounded in lateral view; dorsolateral eyes large, well pigmented, subcircular; strong conical dorsal tubercle present above eye. Pereonite 1 fused with cephalon, line of fusion marked by slit in ventral margin. Pereonites 2 and 3 unornamented. Pereonite 4 cylindrical, about 4 times longer than wide, lacking ornamentation. Pereonites 5–7 decreasing in length posteriorly, irregularly rugose but lacking clearly defined tubercles or spines. Pleotelson with 2 anterior fused pleonites weakly indicated dorsally; apex rounded.

Antennule of 4 articles, basal article longer and broader than articles 2 and 3, with blunt conical tubercle dorsally; flagellum subequal in length to three basal articles, bearing row of about 15 pairs of aesthetascs along ventral surface. Antenna with 2 basal articles short, articles 3–5 elongate-cylindrical, unornamented; flagellum of 3 articles, each bearing row of flattened spines on ventral surface, terminal article also bearing strong curved terminal spine. Mandibular incisor of 4 cusps; lacinia mobilis dentate, distally noticeably bifid; spine row having 2 fringed spines; molar broadly truncate with strong marginal teeth. Maxilla 1, inner ramus bearing 4 distal fringed setae; outer ra-

mus with about 8 sparsely toothed stout spines, feathery setae on mesial margin. Maxilla 2, inner ramus with about 10 mesiodistal fringed setae; inner lobe of outer ramus bearing 2 distal elongate setae, outer lobe with 3 elongate setae. Maxillipedal palp of 5 articles, article 1 short, article 3 longest and widest, articles 2–5 each bearing several fringed setae mesiodistally; endite distally rounded-truncate, with 4 short fringed setae, mesial margin bearing single strong coupling hook, inner surface of mesial area bearing 2 elongate setae. Pereopod 1 with carpus bearing row of finely fringed setae on posterior margin; propodus bearing 5 fringed setae on posterior margin plus several groups of setae on outer surface, single strongly dentate seta distally; dactylus with single elongate finely fringed terminal seta. Pereopods 2–4 similar, lacking dactylus, with propodi, carpi, and meri bearing elongate setae on posterior margins. Pereopods 5–7 stout, prehensile, dactylus strongly biunguiculate. Pleopod 1, basis with 3 retinaculæ; exopod subequal in length to endopod, with strong notch in lateral margin having 2 elongate fringed setae; distal margins of both rami bearing 5 or 6 elongate plumose setae. Pleopod 2, basis with 3 retinaculæ; exopod shorter than endopod, with 7 plumose setae on distal margin; endopod having 4 plumose setae on distal margin; copulatory stylet stout, articulating near base of endopod, grooved for most of its length, distal third consisting of slender sinuous styliform structure. Pleopod 3, endopod elliptical, lacking marginal setae; exopod shorter than endopod, bearing 2 distal fringed setae. Pleopods 4 and 5 similar, endopod elliptical, lacking marginal setae; exopod shorter than endopod, with single laterodistal fringed seta. Uropod with outer ramus triangular, margins setulose; inner ramus half length and one-third basal width of outer, bearing single strong apical seta.

Female: Integument relatively more tuberculate than in male. Cephalon with strong conical middorsal tubercle, submedian pair

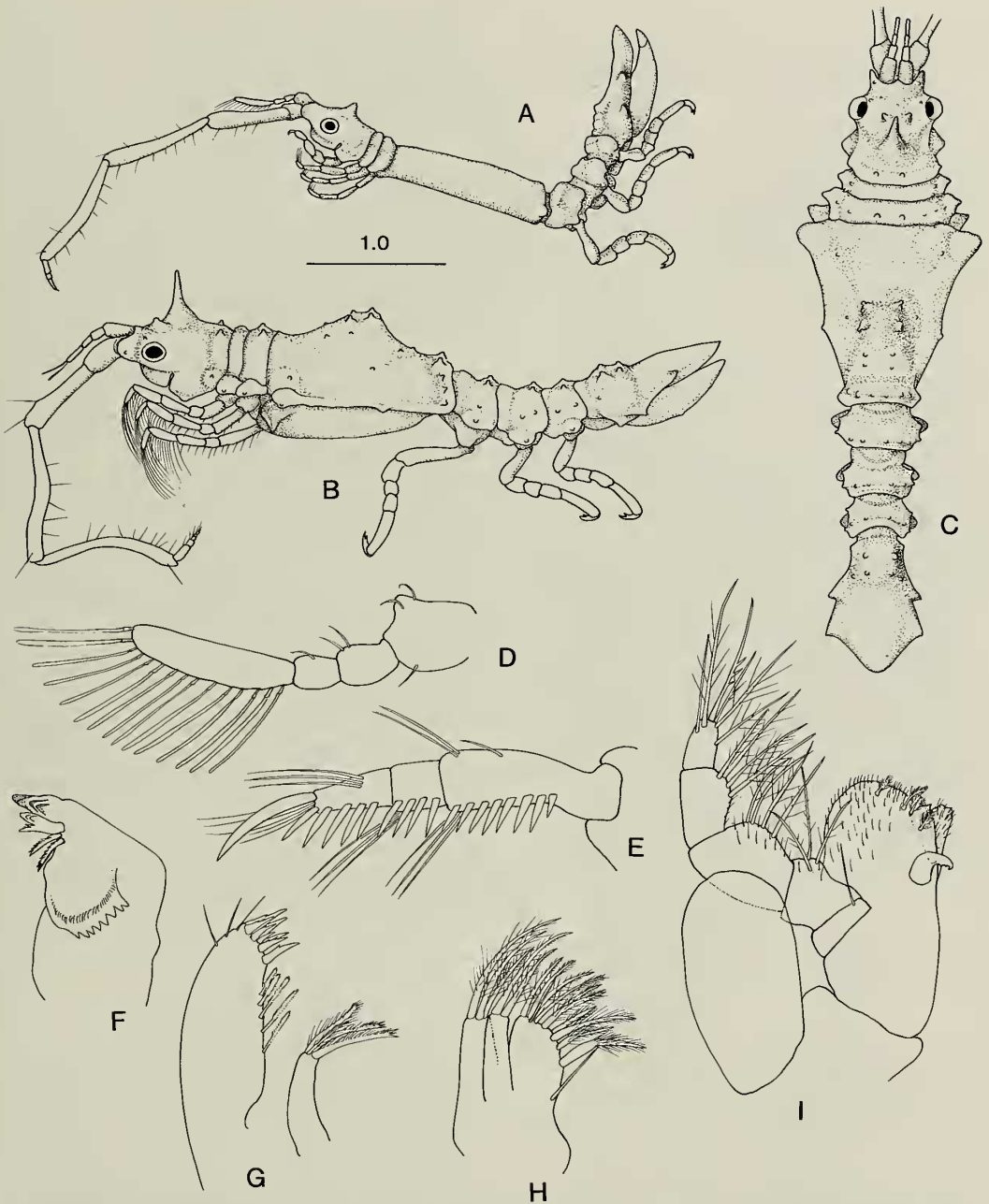


Fig. 14. *Astacilla marna*. A, male in lateral view; B, female in lateral view; C, female in dorsal view; D, antennule; E, flagellum of antenna; F, mandible; G, maxilla 1; H, maxilla 2; I, maxilliped.

of smaller tubercles between eyes; fused pereonite 1 with submedian dorsal pair of small tubercles. Pereonites 2 and 3 with few small scattered tubercles. Pereonite 4, anterior

width subequal to midlength, tapering posteriorly in dorsal view, anterolateral corners rounded, with triangular anteroventral tubercle visible in dorsal view; raised area at

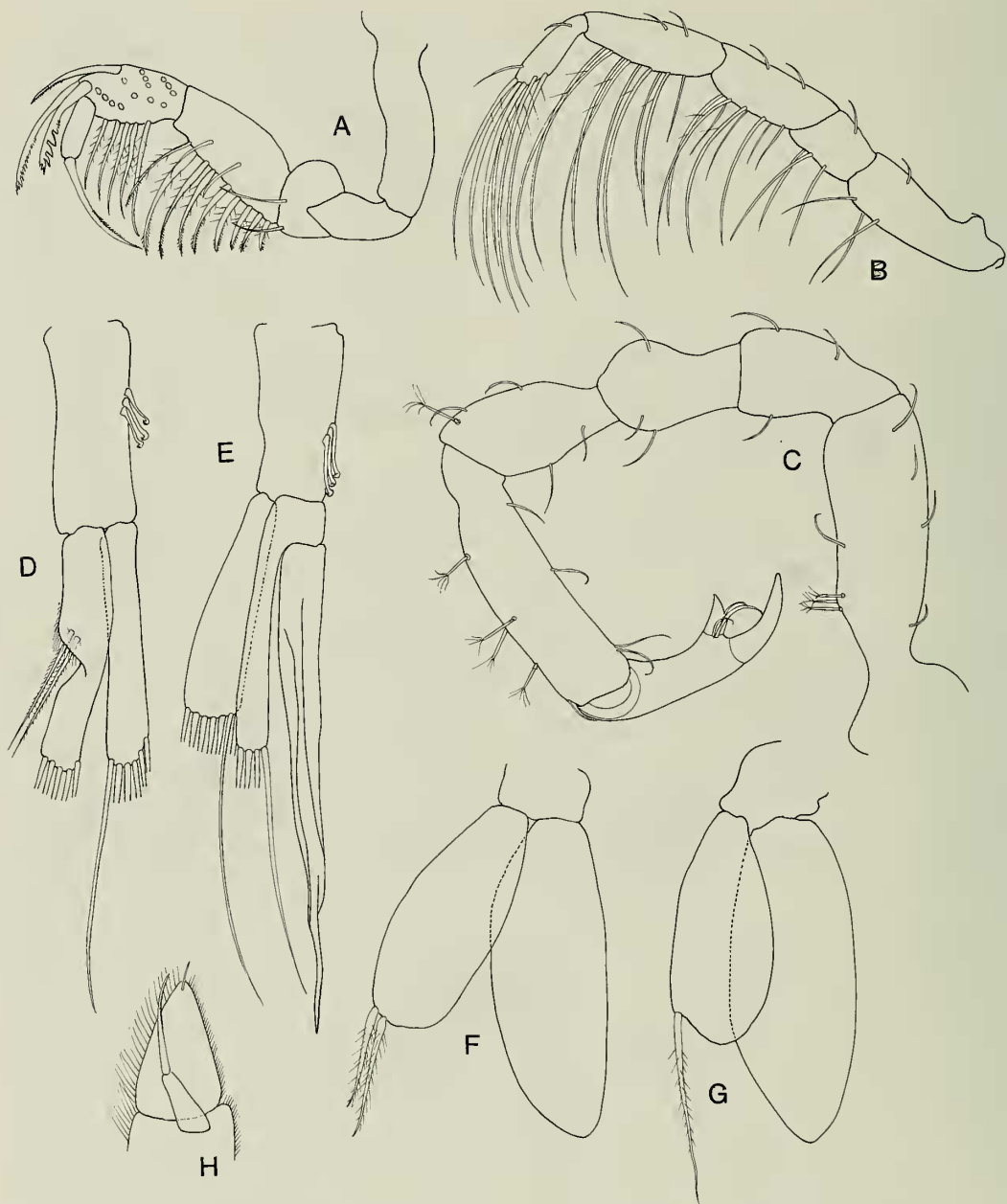


Fig. 15. *Astacilla marna*. A, pereopod 1; B, pereopod 2; C, pereopod 7; D, pleopod 1; E, pleopod 2; F, pleopod 3; G, pleopod 4; H, apex of uropod.

about middle of dorsal surface formed by 4 tubercles arranged in square; several small scattered tubercles on irregular surface of tergum; row of small tubercles along posterior margin. Pereonites 5-7 similar, de-

creasing in length posteriorly, more tuberculate than in male. Pleotelson as in male.

Remarks.—Of the three species of *Astacilla* known from the Caribbean area, *A. marna* most closely resembles *A. spinata*

(Menzies & Kruczynski, 1983) (= *A. regina* Kensley, 1984, known from Belize, Barbados, and St. Lucia; see Müller 1993c). Many differences separate these two species, most notably in size (*A. spinata* is roughly twice as large as *A. marna*), general body proportions of the male and ovigerous female as well as in ornamentation. Differences in the appendages, e.g., the antennal flagellum (2 non-spinose articles in *A. spinata*, 3 spinose articles in *A. marna*), the setation of the notch of the exopod of pleopod 1 (3 long setae in *A. spinata*, 2 in *A. marna*), copulatory stylet of the male pleopod 2 (apically bifid in *A. spinata*, with a single stylet in *A. marna*), uropodal setation (endopod with two apical setae in *A. spinata*, one in *A. marna*), also easily differentiate these two species.

Arcturella sawayae Moreira, 1973, from the São Paulo region of Brazil and known only from a single ovigerous female, has a strong pair of tubercles on the cephalon, a single strong spinose tubercle on each of pereonites 1–3, lacks middorsal tubercles on pereonite 4, and is over twice the length of *Astacilla marna*.

Etymology.—The species is named for Ms. Marna Disbrow of Vancouver, Canada, whose generosity made the second Dominica fieldtrip possible.

Acknowledgments

We thank Dr. Darryl Felder, University of Southwestern Louisiana, Dr. Richard W. Heard, Gulf Coast Research Laboratory, Mississippi, and Dr. Rafael Lemaitre, Smithsonian Institution, for making material available for study. Ms. Marna Disbrow of Vancouver, Canada, made funds available for a visit to Dominica, as did the Office of the Director, National Museum of Natural History, in support of its membership in the consortium overseeing the Archbold Tropical Research Center. We gratefully acknowledge logistical help from the Marine Fisheries Section of Tobago Fisheries in

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Literature Cited

- Carvacho, A., & Y. Haasmann. 1984. Isopodos litorales de Oaxaca, Pacifico Mexican.—Cahiers de Biologie Marine 25:15–32.
- Harrison, K., & J. P. Ellis. 1991. The genera of the Sphaeromatidae (Crustacea: Isopoda): a key and distribution list.—Invertebrate Taxonomy 5: 915–952.
- , & D. M. Holdich. 1982. New eubranchiata sphaeromatid isopods from Queensland waters.—Memoirs of the Queensland Museum 20(3):421–446.
- Holdich, D. M., & K. Harrison. 1981. The sphaeromatid isopod genus *Sphaeromopsis* Holdich & Jones in African, Australian and South American waters.—Crustaceana 41(3):286–300.
- , & D. A. Jones. 1973. The systematics and ecology of a new genus of sand beach isopod (Sphaeromatidae) from Kenya.—Journal of Zoology, London 171:385–395.
- Javed, W., & R. Ahmed. 1988. *Paraimene tuberculata*, a new genus and species of Isopoda (Sphaeromatidae) from Karachi, Pakistan.—Hydrobiologia 169:371–377.
- Kensley, B. 1984. The Atlantic Barrier Reef Ecosystem at Carrie Bow Cay, Belize, III: new marine Isopoda.—Smithsonian Contributions to the Marine Sciences 24:1–81.
- . 1987. Further records of marine isopods from the Caribbean.—Proceedings of the Biological Society of Washington 100:559–577.
- , & M. Schotte. 1989. Guide to the marine isopod crustaceans of the Caribbean. Smithsonian Institution Press, Washington D.C. and London, 308 pp.
- Loyola e Silva, J. 1960. Sphaeromatidae do Litoral Brasileiro (Isopoda—Crustaceae).—Boletim da Universidade do Parana, Zoologia 4:1–182.
- Menzies, R. J., & W. L. Kruczynski. 1983. Isopod Crustacea (exclusive of Epicaridae).—Memoirs of the Hourglass Cruises 6:1–126.
- Moreira, P. S. 1973. *Arcturella sawayae*, a new species of Isopod Crustacea from southern Brazil.—Boletim do Zoologia e Biologia Marine, n.s. 30: 185–194.
- Müller, H.-G. 1988a. The genus *Gnathia* Leach (Isopoda) from the Santa Marta area, northern Colombia, with a review of Gnathiidea from the Caribbean Sea and Gulf of Mexico.—Bijdragen tot de Dierkunde 58(1):88–104.
- . 1988b. Idoteidae aus N-Kolumbien mit Beschreibung von *Edotia samariensis* n. sp. (Crus-

- tacea: Isopoda: Valvifera).—*Senckenbergiana Biologia* 68(4/6):407–412.
- . 1989. Joeropsidae aus N-Kolumbien, mit zwei Neubeschreibungen (Crustacea: Isopoda: Asellota).—*Senckenbergiana Biologia* 69(4/6):389–396.
- . 1990a. Janiridae from the Caribbean Sea of N-Colombia (Crustacea: Isopoda: Asellota).—*Senckenbergiana Biologia* 70(1/3):203–207.
- . 1990b. Stenetriidae from the Caribbean Sea of N-Colombia (Crustacea: Isopoda: Asellota).—*Senckenbergiana Biologia* 70(4/6):397–404.
- . 1990c. Hyssuridae from the Caribbean coast of Colombia, with descriptions of four new species (Isopoda: Anthuridea).—*Bijdragen tot de Dierkunde* 60(2):65–78.
- . 1990d. Paranthurid isopods from the Caribbean Sea of Colombia (Crustacea).—*Bulletin Zoologisch Museum, Universiteit van Amsterdam* 12(13):181–195.
- . 1991. Description of *Metacirolana agujae* n. sp. and redescription of *M. agaricicola* Kensley, 1984, from the Caribbean Sea of Colombia (Isopoda: Cirolanidae).—*Bijdragen tot de Dierkunde* 61(1):17–30.
- . 1992. Anthuridae of the genera *Amakusanthura*, *Cortezura* and *Mesanthura* from the Caribbean Sea of Colombia (Crustacea: Isopoda).—*Revue Suisse Zoologie* 99(1):31–79.
- . 1993a. On the occurrence of the isopods *Heteroserolis mgrayi* (Menzies & Frankenberg, 1966) (Sphaeromatidae) in the Santa Marta area, Caribbean Sea of Colombia, with notes on its variation.—*Zoologische Anzeiger* 230(1/2):35–44.
- . 1993b. Cirolanidae of the genera *Calyptolana*, *Cirolana*, *Neocirolana*, *Colopisthus* and *Exciorolana* from the Santa Marta area, Caribbean Sea of Colombia (Crustacea: Isopoda: Cy-mothoidea).—*Zoologischer Anzeiger* 230(5/6):191–225.
- . 1993c. Arcturidae (Isopoda) from the Santa Marta area, northern Colombia, with a review of the shallow-water species from the Caribbean Sea and Gulf of Mexico.—*Mitteilungen aus der Zoologisches Museum Berlin* 69(2):317–337.
- Richardson, H. 1902. The marine and terrestrial isopods of the Bermudas, with descriptions of new genera and species.—*Transactions of the Connecticut Academy of Sciences* 11:277–310.
- Schultz, G. A., & L. R. McCloskey. 1967. Isopod crustaceans from the coral *Oculina arbuscula* Verrill.—*Journal of the Elisha Mitchell Scientific Society* 83(2):103–113.
- Van Name, W. G. 1936. The American land and freshwater isopod Crustacea.—*Bulletin of the American Museum of Natural History* 71:i–vii, 1–535.

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